EDITOR'S COLUMN

EPA'S PROPOSED LEAD PHASE DOWN

What it means to YOU

There seems to be a great deal of confusion and mis-information circulating in antique and classic car circles concerning the Environmental Protection Agency's proposed "Lead Phase Down" legislation. This issue is of the utmost importance to anyone owning an automobile requiring high-octane leaded gasoline. These excerpts from the Federal Register, Volume 49, Number 150 summarize the EPA's plans.

It is important that everyone concerned with antique and classic cars make their feelings known on this issue, as Congress and the EPA accept a lack of response as approval of this legislation as written. Write to your Senator about Amendment S-2382 to Bill S-568, and your Representative about Bill HR-84-50. The Senate address is Washington, DC 20510; the House of Representatives address is Washington, DC 20515. Also, contact Richard G. Kozlowski, Director, Field Operations and Support Division (EN-397F), Environmental Protection Agency, 401 M Street SW, Washington, DC 20460, Telephone (202) 382-2633.

This is truly a case of "If you don't vote, you don't count." — Editor.

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 80

[AMS-FRL 2620-4]

Regulation of Fuels and Fuel Additives; Lead Phase Down

Agency: Environmental Protection Agency (EPA).
Action: Proposed rule.

SUMMARY: EPA is proposing a lead content standard of 0.10 gram of lead per gallon of leaded gasoline (gplg), effective January 1, 1986. This standard would replace the current standard of 1.10 gplg.

Rick Mitchell's "Sprint 200 Registry" is in its second year. Rick publishes a very informative quarterly newsletter, the *Sprint Print.* Several other Registries are currently looking for "special Mustangs." Contact the Registry that lists your Mustang. These guys really work hard getting this information together, and the Registries help ALL Mustang enthusiasts.

Boss 302 Registry
Randy Ream
1817 Janet Avenue
Lebanon, PA 17042

Boss 429 Registry
Steve Strange
4228 Conklin
Spokane, WA 99203

In Search of Mustangs
Jim Smart
Box 6226
Lakeland, FL 33807

Twister Special Registry
Terry Fritts
7520 NW Rochester
Topeka, KS 66617

Sprint 200 Registry
Rick Mitchell
428 Madingley Road
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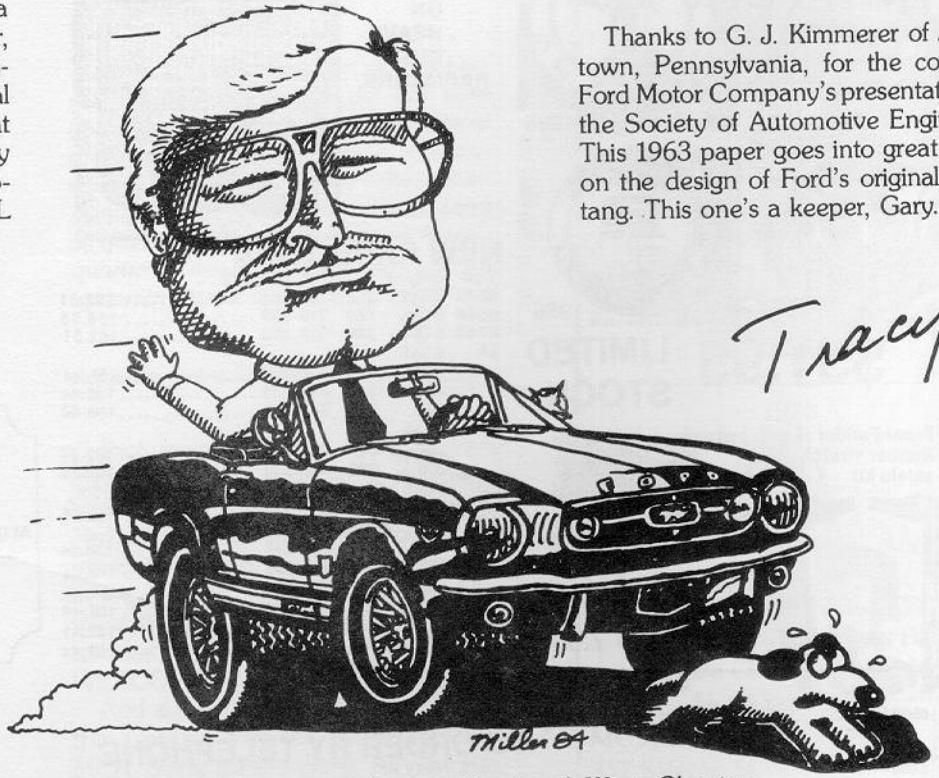

Congratulations to James Aberts of West Chester, Pennsylvania. His 1970 Boss 302 was the cover car and full color feature in the October "Cars and Parts."

NEWS AND NOTES

Thanks to G. J. Kimmerer of Allentown, Pennsylvania, for the copy of Ford Motor Company's presentation to the Society of Automotive Engineers. This 1963 paper goes into great detail on the design of Ford's original Mustang. This one's a keeper, Gary.

There are two reasons for EPA's proposal to reduce lead in gasoline. The misuse of leaded gasoline in vehicles designed for unleaded gasoline ("misfueling" or "fuel switching") is widespread and persistent. Misfueling poisons catalytic converters, resulting in a very high increase in emissions of several pollutants that adversely affect the public health and welfare (hydrocarbons, carbon monoxide, and nitrogen oxides). It has also resulted in higher lead usage than predicted by the Agency. The Agency is also increasingly concerned about the adverse health effects of lead in gasoline since its previous rulemaking on this subject in 1982, newly published studies and reanalyses of previously available information have heightened the Agency's concern about such effects.

The Agency is proposing a 1986 standard of 0.10 gplg instead of an immediate ban to effect EPA's objective because a large number of older vehicles (as well as other types of equipment) require a valve lubricant and it appears that no environmentally acceptable alternative to lead as such a lubricant is currently available. The Agency believes that the proposed standard of 0.10 gplg would provide an adequate amount of lead for this purpose.

The Agency is proposing two approaches relating to long term lead usage. The first would ban lead in gasoline by about 1995 by regulation. The second would impose no additional regulatory action beyond the 0.10 gplg standard on the premise that the reduction in total lead usage caused by vehicle and engine turnover would eliminate the need for lead and therefore its use.

The use of leaded gasoline in vehicles designed and certified by EPA to use only unleaded gasoline, termed "fuel switching" or "misfueling," is of major concern to the Agency. Misfueling can occur by removing or damaging the nozzle restrictor installed in the fuel filler inlet of a vehicle equipped with a catalytic converter, by using an improper size fuel nozzle, or by funneling leaded gasoline into the gas tank. Sometimes gasoline retailers sell gasoline that is midlabeled or contaminated, but this accounts for less than one-half of 1% of misfueling. It is believed that the motivations for intentional misfueling are attempts to save money and/or to improve vehicle performance, since leaded regular gasoline is cheaper and higher in octane than unleaded regular gasoline. This practice is of great concern to the Agency both because it results in greater use of lead in gasoline, as discussed in Part III.B of this notice, and because leaded gasoline poisons catalytic converters and thereby causes very large increases in several pollutants, as discussed below.

The 1982 EPA motor vehicle emissions tampering survey (the most recent compiled by the Agency) has quantified this problem, based on inspections for three indicators of such fuel switching; the removal of the vehicle's filler inlet restrictor, the presence of leaded gasoline in the tank, and the detection of lead deposits on the tailpipe by a lead sensitive "Plumbtesmo" test paper. EPA considers the vehicle to be misfueled if any of these indicators is observed. Adjusting the fuel switching rates results in an estimated national fuel switching rate of 13.5% of unleaded-designed vehicles.

The main conclusions reached in 1982 are an important reference point for further discussion, and they are summarized as follows:

(1) EPA concluded that environmental lead exposure is a national health problem. In particular, EPA was concerned about elevated blood lead levels in young children.

(2) EPA concluded that gasoline lead is a major source of lead exposure, accounting for 90% of total airborne emissions and contributing significantly to non-air pathways of exposure, e.g., ingestion of dust and dirt lead. In addition, the Agency found that gasoline lead usage is correlated with blood lead levels.

(3) EPA concluded that the evidence available at that time on neurological effects at low blood lead levels tended to confirm the Agency's judgment on the need to take all reasonable steps to control lead emissions (47 FR 38077).

Based on this rationale, EPA concluded that it should adopt more stringent gasoline lead content regulations. In this notice current information on this subject area, including new studies, will be examined within the context of this regulatory rationale.

Several new studies on the relationship of gasoline lead to blood lead levels have become available since the 1982 rulemaking. These studies include the following:

(1) An updated report of the Italian Lead Isotope Study (Facchetti and Geiss 1982) was designed based on the fact that non-radioactive isotopes of lead are stable. By examining the varying proportions of isotopes present in the blood and in environmental samples, the source of the blood lead can be determined. In this study, the isotope ratio of lead in gasoline in Northwest Italy was altered and the contribution of gasoline lead to blood lead levels was analyzed by monitoring the lead isotope ratio in blood lead. The results to date show that from 3 to 5 $\mu g/dl$ of the blood lead in adult males came from gasoline lead. This study clearly demonstrates gasoline lead uptake by adult males and confirms an earlier study in Dallas (Manton 1977; Stephens 1981).

(2) The published version of the CDC/NCHS studies (Annest 1983) reports the same conclusion as the earlier analyses examined by the NAAQS time trend review group (see Part III.C.3.a., above).

(3) An EPA study (Schwartz, Pitcher and Janney 1983) examined the blood lead/gasoline lead relationship using three different blood lead data bases — NHANES II, CDC blood lead screening data, and Chicago Health Department blood lead data. This study, an expansion of that reviewed by the NAAQS time trend review group, was done specifically to address issues of causality and potential confounding factors. It does not differ in results from the earlier version. The study found a strong relationship between blood lead and gasoline lead for each blood lead data base.

(4) A study on umbilical cord lead (Rabinowitz and Needleman 1983) showed a strong relationship between

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gasoline lead and umbilical cord lead levels in Boston.

c. *Conclusions.* After reexamining the previously available information, as well as new information, EPA concludes that its previous finding that there is a relationship between gasoline lead usage and blood lead levels is still valid. In addition, EPA also believes that while some of the earlier cautions on the use of certain data to support this correlation are still appropriate, the diversity of analyses that continue to produce consistent results allows the Agency to place more confidence in these studies with respect to their usefulness in the development of regulatory options.

The list of demonstrated health effects at blood lead levels exceeding 30 μg/dl is well-established. The existing air quality criteria document for lead (1978) and the first external review draft of a revised criteria document (1983) contain excellent summaries of such effects, which include: (1) Death due to lead encephalopathy and renal dysfunction at blood lead levels of 80+ μg/dl; (2) frank anemia, anorexia, abdominal pain, and vomiting at 70 μg/dl; (3) reduced hemoglobin, cognitive/central nervous system (CNS) deficits and slowed nerve condition velocity at 40 μg/dl; and (4) vitamin D metabolism interference at 30+ μg/de.

Gasoline lead usage is not being reduced as rapidly as expected by the Agency. A major reason is the widespread occurrence of fuel switching, which is presently found in about 13.5% of vehicles designed for unleaded gasoline. Use of leaded gasoline in such vehicles poisons their catalytic converters, causing a substantial increase in HC, CO and NOx emissions. Such increased use of leaded gasoline also results in increased tailpipe lead emissions. Fuel switching at the rate found today is likely to cause an indefinite general demand for leaded gasoline. For example, misfueling is predicted to account for close to 40% of the demand for leaded gasoline by 1990.

Because of its effect on motor vehicle catalytic converters and its impact on public health, the Agency would like to reduce and ultimately eliminate the use of lead in gasoline as quickly as feasible. EPA believes that the refining industry may be able to produce all unleaded gasoline as early as 1986. However, such an action could have an adverse impact on older automobiles, as well as certain trucks and other vehicles, as described below. In order to prevent this impact, the Agency at this time is proposing a leaded gasoline standard of 0.10 gplg, effective January 1, 1986.

The proposed standard of 1.10 gplg is intended to provide the minimum amount of lead needed to prevent valve-seat recession in older automobiles, certain trucks and other vehicles. In many older engine designs, cylinder heads are made of cast iron. In these engines, exhaust valve-seats are ground directly into the cylinder head itself without special surface treatment. Under high temperatures, loads or speeds, use of fuel in such engines that does not contain some amount of lead or other additive may result in valve-seat recession or abnormal valve-seat wear. Lead compounds produced by combustion of fuel containing such additives form deposits on the valve-seat, producing an anti-welding, lubricating film between the valve-seat and face during engine operation. Valve-seat recession causes leaking valves, loss of compression pressure in the cylinders, degraded vehicle performance, and significant increases in hydrocarbon emissions.

EPA estimates that in 1986 there will be about 20.5 million light-duty vehicles (automobiles) and light-duty trucks on the road that may require use of a fuel containing some amount of lead or other additive to protect against valve-seat recession.

EPA has examined the available studies on the amount of lead needed to protect against valve-seat recession, which are summarized in a January 16, 1984, memorandum that has been placed in the docket. The minimum lead level sufficient for this purpose, as reported in the literature, ranges from "more than 0.03 grams per gallon" (gpg) to 0.50 gpg. In evaluating these studies, EPA has given the most weight to the Doelling (1971) study, which is the only analysis that had as an objective the determination of the minimum lead level needed to prevent valve-seat recession. In this study, tests were conducted at lead levels, recession was not found, while at 0.04 gpg it was experienced. Thus, Doelling concluded that between 0.04 and 0.07 gpg was needed to protect against valve recession. A similarly low amount of lead as the minimum amount needed for this purpose was also found by Giles (1971), who concluded that less than 0.03 gpg led to valve-seat recession, and by Pahnke and Conte (1969), who concluded that gasoline containing 0.10 gpg was adequate to prevent this problem. EPA has placed less weight on other studies which cite higher levels of lead as being necessary, since these were not designed to determine the minimum amount of lead needed to prevent valve-seat recession. In particular, studies which concluded that 0.50 gpg is needed for this purpose may have been affected by the knowledge that the first 0.50 gpg of lead provides a large octane boost.

Since the minimum amount of lead needed to prevent valve-seat recession has not been precisely determined, EPA is proposing a standard of 0.10 gplg. This level is supported by the three studies cited above, all of which found such a lead level adequate to protect against this problem. This level should assure that all engines actually receive an adequate amount of lead for this purpose.

EPA intends that this rulemaking will eliminate or drastically reduce fuel switching by vehicle owners. The proposed standard of 0.10 gplg is intended to allow only enough lead in gasoline to prevent valve problems in certain engines, mainly in trucks and older cars. The Agency anticipates that leaded gasoline will continue to be produced at the 89 octane level (R+M)/2) and therefore be more costly to make than unleaded gasoline produced at an 87 octane level. This would result from the fact that the blending stock for leaded gasoline would have to have greater than 88 octane prior to the addition of the allowable 0.10 gram of lead. Production of such a blending

stock would by itself be more costly than production of unleaded gasoline at the lower octane level. Since lead gasoline is expected to cost more to produce than unleaded, the Agency would hope that its retail price would reflect this cost differential and that leaded gasoline would no longer be marketed as a lower-priced "loss leader," as it is today. Thus, there would no longer be an incentive to vehicle owners to buy leaded gasoline as the least expensive grade. This would therefore eliminate the major incentive for fuel switching.

EPA's overall objective is to end the use of lead as a gasoline additive to prevent unacceptable health effects and misfueling while protecting engines designed strictly for the use of leaded fuel. In the short term we are reducing lead use by over 90%. That level will protect public health without harming vehicles in use that were designed for leaded gasoline.

In the long run, we can probably stop using lead as a gasoline additive completely since few engines designed for leaded gasoline are expected to be in use, and since we expect other additives or other approaches to be developed as a lead alternative for those remaining vehicles. These estimates, however, may turn out to be incorrect should manufacturers continue to produce vehicles which need leaded gasoline or should leaded gasoline continue to be cheaper.

EPA is proposing two alternatives relating to long term lead usage:

(a) No further regulatory action beyond the 0.10 gplg standard. We expect fewer and fewer vehicles requiring lead to be in use and this will make it more difficult to purchase low lead. Low lead will likely become more expensive as its production cost increases and demand decreases. The above trend should force the design of engines not requiring lead for these few remaining applications and should create an incentive for development of other additives and other alternatives. This trend, if it occurs, would lead to the elimination of the need for lead and hence the elimination of its use.

(b) A ban on the future use of lead as a gasoline additive, specifically by about 1995. This alternative assures that the use of lead is stopped by some specific date and hence creates a strong incentive for development of alternative engines and additives. However, it is difficult to pick a date that we can be certain provides enough time for the development of alternatives. If we are wrong, a ban could leave owners of those few vehicles needing lead with problems, if other solutions are not found.

Because EPA is concerned that each gallon of leaded gasoline sold contain the minimum amount of lead needed to prevent valve-seat recession, the Agency requests comments on whether regulatory provisions should be modified or added to accomplish this goal.

Lead is an inexpensive way for refiners to boost the octane of gasoline. If they are required to use less lead, they must use more expensive methods to increase the octane of their gasoline.

Under a total ban on the use of lead in gasoline, refiners might consider use of other additives for one or both of the following purposes: to serve as an engine valve lubricant; and /or to increase the octane of gasoline. Under the proposed 0.10 gplg standard, however, they would likely be considered for use only as an octane enhancer because such a standard would provide an adequate amount of lead for valve lubrication.

To increase the octane of gasoline, various methods are technically feasible for use in the production both of unleaded gasoline and of low-lead leaded gasoline under the proposed 0.10 gplg standard. Octane in these products could be enhanced by the use of one or more of the following means: (1) Further refinery processing with catalytic crackers and reformers (and possibly isomerization units); (2) increased use of MMT or other chemical additives; and /or (3) increased use of alcohol.

MMT is a manganese additive whose use is currently allowed only in leaded gasoline.

Alcohols may also have adverse effects on the polymers and elastomers in vehicles. Since vehicles that use leaded gasoline are generally older, some of these parts are already worn, so the alcohol may increase their wearout. Further, the use of such alcohol in the tank of an older vehicle may cause clogged fuel filters, since it picks up old dirt particles. If the fuel metering system is affected adversely, the vehicle may run poorly. For these driveability reasons, it is unlikely that major refiners would use high levels of alcohols in low-lead gasoline produced for older vehicles.

Another alternative considered by the Agency is a Federal ban on fuel switching by individual vehicle owners and operators.

The Agency believes that a direct prohibition on individual fuel switching, coupled with a vigorous enforcement effort, would be effective in reducing the amount of fuel switching. However, the Clean Air Act presently does not clearly authorize such a prohibition, and the Agency recently asked Congress to amend the Act to specifically prohibit both fuel switching and tampering with emission control equipment by individuals. Even if such authority is available, however, it is unlikely to eliminate this practice entirely, because fuel switching by retailers and others currently liable under the regulations occurs today at a significant rate and because enforcement of regulations affecting millions of gasoline refuelings would be difficult. Furthermore, such a ban would not affect the legal use of leaded gasoline or the adverse health impacts caused by lead emissions from such use. Therefore, this alternative would not achieve all of the purposes of the proposed rule. MI