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Background Statement on Antiknock Compounds

Antiknock compounds are an essential ingredient of modern gasoline. They make possible the efficient and economical production of high quality gasoline, and save the American public some $2 billion annually on its gasoline bill. While they are a part of the gasoline--which is burned inside an automobile engine and its waste products exhausted--antiknock compounds are not a significant factor in air pollution, do not contribute to smog formation, and present no public health problem. Any restrictions in the use of antiknock compounds would in no way solve the problem of air pollution but would have serious consequences on the motoring public, the oil industry, and tha national economy.

The Role of Antiknock Compounds

Antiknock compounds, which are chemicals containing metallic lead, are added to gasoline in small amounts to give the fuel its desired octane number or ability to produce power. Only about a half teaspoonful of the active antiknock ingredient is added to a gallon of gasoline, on the average. Antiknock compounds are used, in an economic balance, with refinery processes which also increase gasoline octane number. However, antiknock compounds achieve higher octane gasoline at an important saving in crude petroleum whereas octane improvement processes require more petroleum to accomplish the same purpose. Over the last 25 years, antiknock compounds have conserved an estimated 5 billion barrels of crude petroleum, worth $15 billion at current prices.

Besides increasing gasoline octane number, antiknock compounds also serve the oil industry as a refinery tool. They help refiners to balance the relative demand for premium and regular gasoline, to balance their total gasoline demand against the demand for other products, and to adjust to seasonal fluctuations in product demand. They also help refiners to better plan and space their capital investments in new processing facilities.

In time of war or national emergency, antiknock compounds do double duty. They give the final lift in antiknock quality to military gasoline, and they help offset the loss of the high octane gasoline fractions which are diverted from civilian to military fuels. Thus, they help to assure military needs of gasoline of sufficiently high octane number, and they help to maintain civilian gasoline quality at adequate levels.

Over the years, by providing optimum gasoline antiknock quality, at the lowest possible cost, antiknock compounds have helped make it possible for more efficient automobile engines to be introduced. These more efficient engines in turn have been able to extract successively more power, increased mileage, and more economical transportation out of every gallon of gasoline. As one measure of this progress, the useful power of automobile engines has more than doubled since 1930. Such transportation progress can be visualized another way when allowance is made for the increasing average weight of cars over the years. Back in 1930, a gallon of gasoline could move a ton of automobile about 25 miles whereas by 1960 a gallon of gasoline would provide 45 ton miles of transportation, for a gain of 80%.

Health Aspects of Antiknock Compounds

Lead antiknock compounds are highly toxic in their concentrated form. In recognition of this fact, an elaborate system of safety controls governs these com-

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However, as ordinarily found in gasoline, the lead alkyl portion of antiknock compounds accounts on the average for only about 1 in 1,700 parts by volume of a gallon of gasoline. Because of their high dilution in the gasoline, antiknock compounds do not contribute materially to the toxicity of gasoline.

As antiknock compounds are consumed in an automobile engine along with the gasoline, they give rise to waste products of lead which are carried off in the automobile exhaust. However, only about 50% or less of the total amount of lead entering the engine (in an antiknock compound) subsequently enters the atmosphere.

Antiknock compounds have been investigated continuously, from the standpoint of public health, for over 40 years. Most of this work was sponsored by the antiknock compound industry, and it was carried out, for the most part, in the Kettering Laboratory in the College of Medicine at the University of Cincinnati.

These investigations have shown:

1. The lead compounds discharged in the automobile exhaust have not created a hazard to the health of the public.

2. The concentrations of lead (from all sources, including antiknock compounds) found generally in the air of American cities are low.

3. The amounts of lead to which the general population is exposed--from all sources, including foods and beverages--are far below hazardous limits.

4. During the past twenty-odd years, there has been little change, on the part of the average American adult, either in his intake and output of lead or in the amounts of lead retained in his body.

Most recently, the U. S. Public Health Service published the results of a comprehensive survey of lead in the atmosphere which it undertook in three major American cities--Los Angeles, Philadelphia and Cincinnati. The Public Health Service study confirmed the earlier findings and showed that atmospheric lead levels are low and present no public health hazards. The same study examined 2,300 people and found that their so-called body burdens of lead are in a normal range in almost all cases.

Effects of Restrictions in Antiknock Compound Use

Any restrictions in the use of antiknock compounds--arising out of ill-conceived efforts to reduce air pollution--would result in higher gasoline costs to the motoring public, reduced car efficiency, an impairment of the oil industry's ability to meet emergency and wartime needs, and an unwarranted waste of the nation's oil resources. Such restrictions on antiknock compounds, moreover, would in no way solve the air pollution problem, but could make it worse.

If antiknock compound were removed from gasoline, and if there were no compensating changes in refinery processing, gasoline octane quality would return to the lower levels of 1954. If, as a result, fuel and engine progress were held to their 1954 levels, motorists would require 10% more gasoline to accomplish the same amount of driving they did in 1964. This factor alone would add over $2 billion to the motorists' annual gasoline bill.

Besides a loss in octane number, motorists would also have to contend with impairments in other characteristics of gasoline, which would be evident in the poorer starting, warm-up and acceleration abilities of gasoline. In addition, many late model cars would have to be mechanically altered--at a cost of hundreds of millions of dollars--in order to operate on lower quality gasoline without suffering engine damage.

The cost of gasoline would unquestionably increase, inasmuch as refiners would have to install new equipment, and to process substantially more crude oil, in order to offset the loss of antiknock compounds.

To replace antiknock compounds, the oil industry would have to invest an estimated $3 billion in new and modified octane improvement facilities. In addition, the loss of antiknock compounds would severely disrupt the oil industry's operation, because antiknock compounds are a refinery tool which helps the oil industry to balance the constantly changing demands for gasoline and other refined products. Moreover, refiners would have to make major and expensive adjustments in other gasoline characteristics, particularly in fuel volatility.

Moreover, without antiknock compounds, the oil industry would have to consume an estimated 185 million more barrels of petroleum raw materials a year in order to produce the same volume of gasoline and other products that it does now. Thus, our irreplaceable petroleum resources would be reduced unnecessarily by 185 million barrels a year--and more as gasoline consumption increases.

All refiners would be affected in varying degree by the loss of antiknock compounds. The smaller refiners in particular would be hurt, because they vitally depend on antiknock compounds to remain competitive. Without antiknock compounds to bring their gasoline up to the required standards, many smaller refiners would be forced out of business.

During wars or national emergencies, antiknock compounds represent a margin of safety in producing both civilian and military gasolines. If antiknock compounds were unavailable to the oil industry, the result would be a severe impairment of the industry's ability to meet military and civilian requirements.

Ironically, the elimination of antiknock compounds from gasoline would not solve the air pollution problem. First, the elimination of lead from gasoline would not eliminate all lead from the atmosphere, because the lead in the atmosphere comes from many sources. Second, the elimination of lead from gasoline would mean a marked change in the chemical composition of gasoline, which could very well introduce new and serious problems of air pollution.

Thus, any mandatory restrictions on the use of antiknock compounds would not accomplish any worthwhile purpose, from the standpoint of air pollution, but would have serious effects upon the national economy.

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