To some the Vietnam war is the key to all our problems—end the war and our Nation will be on her way to unprecedented prosperity. These people have the idea all the billions now spent on war will go to the domestic front and everybody will be happy again.

The Communists and the far left group are not about to let us wax prosperious and contented. With the war's end these agitators will be constantly bringing up new problems to rant and rave about.

America is due for a long period of unrest until all of us get back on the path of sanitary in our everyday lives.

To those who are of the opinion this country is the aggressor in Vietnam a recent item in the Metropolitan Press should be enlightening. The Soviets are earmarking more than a billion dollars to North Vietnam to keep the war going. To the Commies this is a sound investment as they want to weaken American public opinion to the point they will not only win in Southeast Asia but it will be a prelude for takeover of this Nation within the next twenty years.

A few dove Congressmen and Senators now feel it is not important for us to be the dominant Nation of the world and that we should cut back militarily and spend the money on the home front.

This would be good reasoning except we are dealing with a cruel and relentless foe and once they (the Soviets) get the upper hand in technical weapons it will be all over for the United States.

Never in our history have we needed a more united front in the cause of freedom and for our own lives. Listening to those who advocate the easy way out could be our undoing.

BAN LEADED GASOLINES NOW

HON. WILLIAM F. RYAN
OF NEW YORK

IN THE HOUSE OF REPRESENTATIVES

Thursday, June 25, 1970

Mr. RYAN. Mr. Speaker, on June 10, H.R. 17255, the Clean Air Act Amendments of 1970, was before this House. All amendments offered were defeated, despite the fact that many of them put effective teeth into the fight against air pollution. This was extremely unfortunate. Rhetoric deploring pollution is merely form without substance. It is easy enough to say that our air must be cleaner and our water cleaner and our land cleaner. But effective, forceful legislation, followed by action of like kind, is what will make the difference.

One place where action is possible and where it can have significant effect is in the area of leaded gasolines. The perils which the current automobile gasolines pose are too great to delay action. This is why I proposed in H.R. 17113, my bill amending the Clean Air Act, that leaded gasolines be banned within 1 year of passage of the legislation. Lead-free gasoline is technologically and economically feasible. The fact that at least one company currently markets such a product establishes his clearly.

While the 1970 amendments have now passed the House, there is no reason why further amendments cannot be enacted into law. For that reason, today I have introduced legislation to ban leaded gasoline within 1 year of passage of this bill.

A recent article by Edward Olsen, curator of mineralogy at the Field Museum of Natural History in Chicago, graphically explains the need for this legislation. Mr. Olsen, in the June 1970 bulletin of the museum, explains that since the late 1940's, the amount of lead particles in snow samples from the Arctic has increased by 300 percent. This enormous increase is due to leaded fuels. As Mr. Olsen reports, over 103 billion gallons of leaded gasoline are consumed in the Northern Hemisphere every year. This consumption generates over 310,000 tons of lead annually.

In our urban areas, the concentration of lead is particularly high. For example, in Chicago in 1968 auto fuels generated about 2¾ tons of lead per square mile. In a recent study conducted in New York City, the lead content of the air on 45th Street was almost ten-millionths of a gram per cubic yard at street level during rush hours. This is about 200 times higher than natural levels.

Edward Olsen reports that for many Americans the blood level concentration of lead is about 0.25 parts per million. According to Mr. Olsen, the threshold for classical lead poisoning is considered to be 0.8 parts per million. However, there are eminent medical authorities who place it at 0.5 parts per million. As Mr. Olsen says, "These numbers are clearly too close together for comfort."

His excellent—and frightening—article follows:

GEOCHEMISTRY—A STUDY OF AIRBORNE LEAD POLLUTION

(By Edward Olsen)

Among the several major branches of the geological sciences the one called *geochemistry* is perhaps the most rapidly growing. The word itself means *chemistry of the earth*, and since the earth consists entirely of chemical combinations of elements into liquids, gases, solid minerals, and biological forms there is very little it doesn't cover. It overlaps such divers disciplines as mineralogy, petrology, petroleum geology, and economic ore geology; and is currently pushing into subject matter traditionally considered the reserve of paleontology.

Traditionally geochemists have considered such problems as where various chemical elements are situated in the internal makeup of the earth. In more recent years they have become more and more concerned with the chemistry of the earth's exterior as well: the dissolved and suspended chemicals in the oceans, lakes, and ground waters; chemistry of the atmosphere; chemistry of soils; chemistry of the ice caps.

Because of current interest in the polar regions more and more data have been gathered concerning them. Probably one of the most interesting and disturbing of recent arctic geochemical studies has been the work of the geochemist, Dr. Claire Patterson of the California Institute of Technology.

In making borings into the Greenland ice it is possible to see each year's accumulation of new snow by the banding that occurs. Thus, by boring out a column one can tell the year in which a given layer was deposited by counting backward, layer by layer, from the present year. The ice for each layer can next be sliced out, melted, and analyses made for the chemicals contained in it. Dr. Patterson has examined a number of such samples and his findings with respect to their year-by-year content of the element *lead* are remarkable. In the graph [graphs do not appear in RECORD] we see the lead content in northwestern Greenland ice plotted against year from 800 B.C. to the present.

The first question that arises is: From where do these small amounts of lead originate? Besides lead, analyses were made for other elements—sodium, magnesium, silicon, etc. Some of these are due to sea salts blown inland from the nearby North Atlantic; some are due to clay dusts blown in from adjacent unglaciated land and islands. Lead, however, is not a significant constituent in any of these sources. It has been known for a long time that there are large rotating systems of air that rise in equatorial regions, and because of the high solar heat levels there, move towards the poles at high altitudes. Then by cooling off they fall slowly to low altitudes and break into systems of surface weather patterns and move slowly southward again. On their way northward any warm rising air can add itself to this giant air movement and be carried poleward also.

Large urban areas are areas of rising warm air due to the heat output from the many sources of energy that men utilize in heating, making electricity, transportation, and normal human activity. Thus, some of the many gases and dust particles that arise from populous areas are added to these poleward moving air masses and portions of them are carried all the way to the arctic regions where some fall out with snows and rains and become incorporated into the seas, and icecaps. Thus the yearly icecap accumulations can act as a sort of natural sample collection system which can show relative changes over periods of historic time.

Mankind has been extracting and using lead since about 2500 B.C. It was about the mid 18th century when industrialization began to grow. This growth was steady with western-world population increases, and demand grew for more kinds of products made of metals, of which lead is a significant one. It is utilized in ceramic glazes, paints, machine bearings, insecticides, fungicides, alloys of many kinds, ammunition, solders, plumbing fixtures, and indirectly in photography and coinage systems. As demand grew more lead has been mined and smelted from its ores. Because lead is easily vaporized in any process that heats it, such as smelting, a certain amount goes up the smelter chimneys, is added to the air, falls in adjacent areas with, however, a little of it being carried aloft and ending up in northern snows. The graph in Figure 1 reveals this steady increase in utilization of lead; around 1750 it shows an upward change in slope. The graph, in addition, shows a dramatic feature. In the late 1940's there is a sudden upward spurt in lead in these ice samples. In less than 20 years it increased by 300%.

It was in the late 1940's that automotive manufacturers began building cars with higher and higher horsepower. Gasoline engine horsepower can be increased in two ways: one way is to increase what is called the compression ratio; the other way is to increase the size of the engine. The manufacturers have done both. To obtain the best efficiency from such engines it is necessary to operate them on fuels that have high octane ratings. We will not go into the meaning of this term here but only point out that the octane rating of a gasoline is a rough measure of how much efficiency one can obtain from a high compression engine. Such engines require gasolines rated near 100 octane. Natural gasoline fractions from petroleum crude oils are about 55 octane. To bring up the rating to the desired level it is necessary to perform some chemical changes on the natural gasoline.

The major change involves a process called cracking. By repetitions of this process, plus performing distillations, it is possible to produce 100, or even higher, octane fuels. In 1920 a chemist, Thomas Midgely, made a

synthetic metal-organic compound called tetraethyl-lead. It is a chemical combination of the elements lead, carbon, and hydrogen. It was found that addition of less than 1% by volume of this compound to gasoline the octane rating could be raised by as much as fifteen octane points. Tetraethyl-lead was less costly to produce than other means of obtaining the same octane increase. It was natural then that it be added to gasolines in the late 1940's.

Gasolines are usually marketed in two forms: so-called "regular," which is around 90 octane, and what is called "premium" (or "high-test" or "ethyl") which is around 100 octane. Both forms contain tetraethyl-lead. Although there are limitations on the amount of tetraethyl-lead that can be added to aircraft fuels, there are no limitations for automotive fuels. In general, auto gasolines contain about 3 cubic centimeters of tetraethyl-lead per gallon. In terms of the actual lead content this amounts to slightly over 3 grams (about one-tenth oz.) of lead per gallon.

When gasoline burns in the engine the tetraethyl-lead decomposes and the lead is released. In order to remove it so that it will not form thick deposits, compounds called ethylene dibromide and ethylene dichloride, are put in the gasoline also. The lead combines with these to form lead bromide and chloride. These, and other lead compounds, come out the exhaust system where they cool in the air, combine with oxygen and moisture, and form several bromine and chlorine acids, and a dust of lead oxide so fine that some of it can be carried along in the air, even as far as the arctic snows.

The pronounced effect of this use of lead on the Greenland snows appears remarkable. The average gasoline automotive vehicle (cars and trucks) runs about 13 miles on a gallon of gas and releases only 3 grams of lead in the process. The great impact lies in the fact that over *103 billion gallons* of such fuel are consumed in the northern hemisphere every year. This generates over 310,000 *tons* of lead. In Figure 2 the graph shows the total of tetraethyl-lead used since 1920. At first its use was small; however, by the late 1940's its annual increase is more and more marked. In total from 1920 to 1970 over 5 million tons of lead have been utilized in auto engines in the northern hemisphere. Averaging this over the hemisphere it comes to 120 pounds of lead per square mile!

Such an average is of course quite high for some low population, rural areas that are not crossed by many roads. On the other hand, it is far too low for city areas. In Chicago, for example, in 1968 auto fuels generated about 2¾ tons of lead per square mile!

The question arises where all this unrecoverable lead goes, besides the relatively small amount that finds its way into the upper atmosphere and then to the arctic. In an area such as Chicago, where the output is very high, a great deal of it settles out in the city dust that covers the streets and gets into homes. The black, oily dust of a typical Chicago windowsill has small amounts of lead in it. Most of it, however, is flushed away by prevailing winds into the Lake Michigan water supply and beyond. Rain water carries down a portion of it into the rivers and then to the sea. Ultimately most of this lead ends up in the oceans. Some of this lead, however, is absorbed by all creatures that breathe air, including people.

It is well-known that lead is a poison. Public health officials point out that lead poisoning falls into two categories: toxic poisoning and chronic poisoning. Toxic poisoning is the result of extreme exposure to inhaled or ingested lead compounds. It usually results in death. A great deal of medical information is available on toxic lead poisoning. Not so much is definitely known, however, about chronic poisoning, which is due to continued exposure to small amounts of lead. It is known to affect the central nervous system, blood vessels, and intestinal tract, as well as other organs. At present there are no clear data on the effect of long term exposure to small amounts of lead. It is known, however, that lead compounds which are swallowed, either directly from the air or with food and water, are only poorly absorbed by the body. Less than 10% of ingested lead is actually absorbed into the blood stream. In terms of ingested lead man is exposed to it in water supplies, canned foods, paints, some dishware, cigarette smoke, most fresh fruits, etc. Unfortunately the lungs are much less discriminating. 25–50% of inhaled lead compounds are absorbed into the blood stream. Inhaled lead seems to be the largest source for it in the human body.

When tetraethyl-lead was originally introduced into auto fuels there were considerably fewer cars, so the problem of adding lead to the air was not considered serious. In addition, it was believed that the body had the ability to eliminate lead (below toxic levels) as fast as it was absorbed. As time has gone on, however, the number of cars has increased. We have also learned that lead builds up in the body. The natural body content of lead, of a primitive man thousands of years ago, was about 2 milligrams. Today the average in the United States is about 100 milligrams, with some city dwellers running as high as 200 milligrams. About 91% of this is deposited in the bones. The bone content of lead increases with age. This, in itself, means that there is no body balance for lead, that is, it cannot be totally eliminated as it is absorbed, otherwise beyond some certain age everyone older than that would have a similar amount in their bones. Instead it keeps accumulating with age—the older you are the more you have. If you live in an urban area, as most Americans do these days, you are exposed to higher amounts and accumulate it faster.

Because the great majority of Americans live in cities where the exposure to lead in the air is great, a number of recent studies have been made to determine the exposure levels. On the average there is about 1 millionth of a gram of lead per cubic yard of city air as opposed to a natural level of about 50 billionths per cubic yard. That is, the city air averages about twenty times higher! In a recent study on 45th St. in New York City, the lead content of the air was almost 10 millionths of a gram per cubic yard at street level during rush hours. This is about 200 times higher than natural levels. Rural dwellers are exposed to only a fraction of such amounts except, however, in highly agricultural areas during the growing season when crops are sprayed with certain lead compounds that act as fungicides and insecticides. Because of such agricultural uses on tobacco crops, smokers expose themselves to more inhaled lead than non-smokers.

The effects of such exposures are not certain by any means. Public health and industrial health doctors vary in their view of it. In reality there are no good scientific data giving a measure of the effect on humans. It is known that for many Americans the blood level concentration of lead is about 0.25 parts per million. The threshold for classical lead poisoning is considered to be 0.8 parts per million, and some medical authorities place it at 0.5 parts per million. These numbers are clearly too close together for comfort!

The question arises whether this addition of lead to the air is necessary? Clearly it is not. Reduction of auto horsepower would allow lower octane ratings and tetraethyl-lead could be eliminated. On the other hand, additional refining and chemical changes can make high octane gasoline without tetraethyl-lead. At least one major petroleum company in the eastern United States sells both regular and high-test *unleaded* gasolines of high octane ratings for high compression engines, *and* at competitive prices. Thus, it is not a matter that would greatly increase the cost to the consumer.

Early this year one major auto manufacturer announced that in the 1971–72 period it would begin production of a lower horsepower engine that does not require leaded fuels. Unfortunately this step is being taken for the wrong reason. Anti-smog devices (required on vehicles by many states) become quickly clogged with lead oxide deposits and require frequent cleaning to operate properly. It is for this reason the change is being made.

In any event, numerous public health officials, as well as university researchers, are becoming alarmed by the addition of lead to the air, which goes eventually to the oceans. Each year over 250,000 tons of lead are added to the seas to be absorbed by fish and lower forms of life. Dependence on the sea for food will increase over the next century. In addition, from certain microscopic sea plants comes the bulk of the world's supply of oxygen. Addition of known toxic elements to the sea can have effects that last forever.

With Dr. Patterson's work the field of geochemistry seems to have entered a new area—the area of public health. The dramatic effect which man's use of lead has had on the geochemical record, as seen in Figure 1, is a clear illustration of the fact so often overlooked: we are living in what is called a closed system. Nothing goes "away"—it only goes somewhere else. Lead is only a part of the picture. It is but one element that man in concentrating, utilizing, and allowing to accumulate ultimately in the oceans. Elements such as mercury, bismuth, and tin are significant elements that are less obvious in their use and less understood in their cycles through the biological world.

If a clear-cut case could be made that lead had no effect on human and other life its use in fuels would never be an issue. With the long-term effects unknown it seems to be folly to continue its use only to learn the effects the hard way.

AN ADDRESS BY HON. MICHAEL COLLINS, ASSISTANT SECRETARY OF STATE AT ST. MICHAEL'S COLLEGE, WINOOSKI, VT.

HON. ROBERT T. STAFFORD

OF VERMONT

IN THE HOUSE OF REPRESENTATIVES

Thursday, June 25, 1970

Mr. STAFFORD. Mr. Speaker, it has been called to my attention by the distinguished president of St. Michael's College, Mr. Bernard Boutin, that that great college's commencement address was delivered by the Honorable Michael Collins, Assistant Secretary of State.

This meritorious address deserves the utmost recognition as an excellent presentation of the hope and optimism that is so necessary for the growth of our great Nation. As the Assistant Secretary pointed out, this hope and trust in the success of our country is not unfounded but is realistically based upon the efforts of those Americans who creatively participate in this democracy. Truly, deeds are what count.

The address referred to follows:

ADDRESS BY THE HONORABLE MICHAEL COLLINS, ASSISTANT SECRETARY OF STATE, JUNE 8, 1970

Some years ago Albert Camus, in ceremonies in Stockholm, received the Nobel Prize for literature.