[6560-01]

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 50]

[FRL 821-4; Docket Number OAQPS 77-1]

LEAD

Proposed National Ambient Air Quality Standard

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: In response to a court order to adopt a national ambient air quality standard for lead, EPA proposes to set a national standard for airborne lead of 1.5 micrograms lead per cubic meter (*μg Pb/m³*), monthly average. Following promulgation of the standard, States will develop implementation plans for EPA approval which demonstrate how the standard will be attained by 1982, and maintained thereafter. The proposed standard for lead is based on EPA judgments about groups in the population that are at particular risk to lead, the lowest levels of lead exposure associated with adverse effects on health, and the relative importance of airborne lead as a source of lead exposure. EPA believes its proposal reflects the increasing concern from medical research about prolonged low level exposure to lead by young children. The air standard proposed by EPA is based on a goal for total lead exposure lower than previously advocated by other Federal agencies. There is, however, continuing controversy over key areas of research underlying the standard. EPA would welcome information and views pertaining to EPA's approach in developing the standard and to the factors discussed in this notice. EPA also believes that the analyses and judgments that will lead to setting the air standard for lead will have strong implications for other regulatory programs related to lead at the Federal and other levels of government. In the six-month period between proposals and final promulgation, EPA will continue its examination of these difficult issues related to setting the level of the ambient air quality standard for lead and will seek to involve the public and other affected Federal agencies, both on the final decisions on this air standard as well as planning on ways to control population exposure to lead from non-air sources.

DATES: Comments must be received by February 17, 1978. There will be a public hearing on January 17, 1978. The standard will be promulgated by June, 1978.

ADDRESS: Send comments to: Mr. Joseph Padgett, Director, Strategies and Air Standards Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

A public hearing will be held at: Environmental Protection Agency, 401 M. Street SW., Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT:

Mr. Joseph Padgett, Director, Telephone: 919-541-5204.

Availability of supporting information: A docket (Number OAQPS-77-1) containing information used by EPA in development of the proposed standard is available for public inspection between 8 a.m. and 4:30 p.m. Monday through Friday, at EPA's Public Information Reference Unit, Room 2922, Waterside Mall, 401 M Street SW., Washington, D.C. 20460.

The Federal Reference Method for collecting and measuring lead and its compounds in the ambient air is described in Appendix G to this proposal. Regulations for development of State implementation plans for lead are proposed under 40 CFR Part 51 elsewhere in this FEDERAL REGISTER. The environmental and economic impacts of implementing this standard are described in an Environmental Impact Statement and an Economic Impact Assessment available upon request from Mr. Joseph Padgett at the address shown above.

The documents "Air Quality Criteria for Lead" and "Control Techniques for Lead Air Emissions" are being issued simultaneously with this proposal. Both documents are available upon request from Mr. Joseph Padgett at the address shown above.

SUPPLEMENTARY INFORMATION:

BACKGROUND

Lead is emitted to the atmosphere by vehicles burning leaded fuel and by certain industries. Lead enters the human body principally through ingestion and inhalation with consequent absorption into the blood stream and distribution to all body tissues. Clinical, epidemiological, and toxicological studies have demonstrated that exposure to lead adversely affects human health.

EPA's initial approach to controlling lead in the air was to limit the lead emissions from automobiles, the principal source of lead air emissions. In January of 1972, EPA proposed regulations under Section 211 of the Clean Air Act for phase-down of the lead in gasoline. Subsequently, this action was divided into the promulgation of regulations for the availability of lead-free gasoline for catalyst-equipped cars and other vehicles certified for unleaded fuel and reproposal of the regulations for lead phase-down in leaded gasoline. The regulations for lead phase-down in the total gasoline pool were promulgated in 1973 and, following litigation, modified and put into effect in 1976.

In 1975, the Natural Resources Defense Council (NRDC) and others brought suit against EPA to list lead under Section 108 of the Clean Air Act as a pollutant for which air quality criteria would be developed and a National Ambient Air Quality Standard be established under Section 109 of the Act. The Court ruled in favor of NRDC. EPA listed lead on March 31, 1976, and proceeded to develop air quality criteria and the standard.

In proposing this air standard, EPA is concerned that there are reciprocal effects between the goals and actions taken to control the level of lead in the air, and the parallel judgments and actions taken under other Federal programs. These other programs include EPA's own responsibilities to set standards for lead in drinking water and for the disposal of hazardous waste, the authorities of the Food and Drug Administration to control lead in food, and the regulations adopted by the Consumer Products Safety Commission to control lead in paint. EPA has raised through the Interagency Regulatory Liaison Group the need to coordinate the programs of the Food and Drug Administration, Consumer Products Safety Commission, and the Occupational Safety and Health Administration. Where appropriate, EPA will continue to work with other Federal agencies in developing a general Federal approach to limiting other avenues of exposure to environmental lead.

In parallel with developing the proposed standards, EPA has used information available to assess the economic impact of technological controls necessary to reduce air emissions of lead from industrial facilities. For primary copper smelters, primary and secondary lead smelters, gray iron foundries and battery plants, attaining the standard may require control of fugitive lead emissions, i.e., those emissions escaping from process steps, other than emissions from smoke stacks. Fugitive emissions are difficult to estimate, measure, or control, and it is also difficult to predict their impact on air quality near the facility. From the information available to the Agency, it does appear that non-ferrous smelters may have great difficulty in achieving lead air quality levels consistent with the proposed standard in areas immediately adjacent to the smelter complex. While the possible impact of the standard on these facilities is of concern to EPA, and will be the subject of continuing studies and analysis, these impacts have not entered into determination of the level of the standard.

LEGISLATIVE REQUIREMENTS FOR NATIONAL AMBIENT AIR QUALITY STANDARDS

Two sections of the Clear Air Act govern the development of a National Ambient Air Quality Standard. Section 108 instructs EPA to document the scientific basis for the standard:

> Sec. 108(a)(2) The Administrator shall issue air quality criteria for an air pollutant within 12 months after he has included such pollutant in a list under paragraph (1). Air quality criteria for an air pollutant shall accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air, in varying quantities. The criteria for an air pollutant, to the extent practicable, shall include information on—
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> (A) those variables factors (including atmospheric conditions) which of themselves or in combination with other factors may alter the effects on public health or welfare of such air pollutant;
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> (B) the types of air pollutants which, when present in the atmosphere, may inter-

> act with such pollutant to produce an adverse effect on public health or welfare; and
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> (C) any known or anticipated adverse effects on welfare.

Section 109 addresses the actual setting of the standard:

> Sec. 109(b)(1) National primary ambient air quality standards, prescribed under subsection (a) shall be ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health. Such primary standards may be revised in the same manner as promulgated.
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> (2) Any national secondary ambient air quality standard prescribed, under subsection (a) shall specify a level of air quality the attainment and maintenance of which in the judgment of the Administrator, based on such criteria, is requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air. Such secondary standards may be revised in the same manner as promulgated.

EPA interprets these sections of the Act to mean that the level of the standard is to be determined from information covered in the Criteria Document pertaining to the health and welfare implications of lead air pollution. This is in contrast to other sections of the Act which allow EPA to consider costs of air pollution control and availability of technological controls in determining the level of a standard. Also, EPA should not attempt to place the standard at a level anticipated to represent the threshold for adverse effects, but should set a more stringent level which provides a margin of safety. EPA believes that the extent of margin of safety represents a judgment issue in which the Agency should consider the severity of adverse effects, the probability that the effects may occur, and uncertainties associated with scientific knowledge about the biologic effects of lead.

DEVELOPMENT OF AIR QUALITY CRITERIA

Following the listing of lead, EPA proceeded with development of the document, "Air Quality Criteria for Lead". In the process of developing the Criteria Document, EPA has provided a number of opportunities for external review and comment. Three drafts of the Criteria Document have been made available for external review and EPA has received 60 to 80 written comments on each draft. The Criteria Document was the subject of three meetings of the Subcommittee on Scientific Criteria for Environmental Lead of EPA's Science Advisory Board. Each of these meetings has been open to the public and a number of individuals have presented both critical review and new information for EPA's consideration.

Development of the Criteria Document indicated to EPA that there are a number of areas in which additional research could provide information useful to determining the level for the lead standard. It is also evident that scientific controversy exists about facts or interpretation of material included in the Criteria Document, including two areas critical to the setting of the standard: the health significance of abnormal biological effects associated with blood lead levels below traditional levels of concern, and the relative significance of lead air emissions as the direct or indirect source of lead exposure, compared to other sources of exposure.

However, the provisions of the Act requiring a deadline for proposal and promulgation of the standard, and the requirements for periodic future review of air quality criteria and standards, indicate that Congress intends for the Agency to proceed even where scientific knowledge is not complete or where there is an absence of full scientific consensus. EPA has, therefore, developed the proposed air standard on the basis of its best judgment as to what the Act requires, and what information the "Air Quality Criteria for Lead" provides. To arrive at the air standard, EPA has attempted to use numerical estimates of key factors. In several instances, factors which are not known precisely have a large effect on the level of the standard. EPA invites information, views and judgments both on its approach to setting a level for the standard and the numerical values used for key factors described in the following sections.

SUMMARY OF GENERAL FINDINGS FROM AIR QUALITY CRITERIA FOR LEAD

From the extensive review of scientific information presented in the Criteria Document, conclusions in several key areas have particular relevance for setting the lead standard.

1. There are multiple sources of lead exposure. In addition to air lead sources include: lead from paint and inks, lead from water supplies and distribution systems, lead from pesticides, and lead in fresh and processed food. The relative contribution to population exposure from each source is difficult to quantify.

2. Exposure to air lead can occur directly by inhalation, or indirectly by ingestion of lead contaminated food, water, or non-food materials including dust and soil.

3. There is a significant variability in response to lead exposure. Certain subgroups within the population are more susceptible to the effects of lead or have a greater potential for exposure. Of these, young children represent a population of foremost concern. Even within a particular population, group response to lead exposure may vary widely from the average response.

4. Within the human body, three systems appear to be most sensitive to interference by lead—the blood-forming or hematopoietic system, the nervous system, and the renal system. In addition, lead has been shown to affect the normal functions of the reproductive, endocrine, hepatic, cardiovascular, immunologic, and gastrointestinal systems.

5. Effects reported in the Criteria Document range from impairment of biochemical systems (inhibition of aminolevulinic acid dehydratase (ALAD)) at a blood lead level of 10 micrograms lead per deciliter blood (μg Pb/dl) to encephalopathy at 80 to 100 μg Pb/dl.

6. From various studies of lead exposure, estimates can be made of the impact of exposure through inhalation and ingestion on blood lead level. Of particular importance, are the estimates of: air lead/blood lead ratios, the percentage of deposition and absorption of air lead, the percentage of absorption of ingested material, estimates of the variability of blood lead within a population exposed to uniform levels of lead, and estimates of the contribution of air lead to blood lead.

Determination of a proposed level for the lead standard requires the use and interpretation of specific information for each of these areas. The approach taken is described in the following sections.

GENERAL APPROACH TO SETTING THE LEAD STANDARD

Development of the National Ambient Air Quality Standard for lead requires certain judgments by EPA about the relationship between concentrations of lead in the air and possible adverse health effects experienced by the public. This relationship is greatly complicated by the fact that lead in the air is not the only source of lead exposure; that there is variability of response among individuals exposed to lead; and that there are numerous effects of lead on health, occurring at various levels of exposure which vary in public health significance.

In developing the standard, EPA has made judgments in five key areas.

1. Determining the critically sensitive population.
2. Determining the pivotal adverse health effect.
3. Determining the mean population blood lead level which would be consistent with protection of the sensitive population.
4. Determining the relationship between air lead exposure and resulting blood lead level.
5. Determining the allowable blood lead increment from air.

DETERMINING THE CRITICALLY SENSITIVE POPULATION

Certain subgroups within the general population differ in sensitivity to lead exposure. Protection of populations exhibiting the greatest sensitivity of response to lead is a major consideration in determining the level of the lead standard. From information presented in the Criteria Document, there are a number of populations for which lead exposure poses a greater risk: young children, pregnant women and the fetus; the occupationally exposed; and individuals suffering from dietary deficiencies or exhibiting the genetic inability to produce certain blood enzymes.

EPA believes that young children (ages 1–5 years) should be regarded as the foremost critically sensitive population for setting the lead standard. This is because hematologic and neurologic effects in children are shown to occur at lower thresholds than adults, and because children have a greater risk of exposure to non-food material containing lead, such as dust and soil, as the result of normal hand-to-mouth activity. The Criteria Document also states that children may be at greater risk than adults due to (1) greater intake of lead via inhalation and ingestion per unit body weight; (2) greater absorption and retention of ingested lead; (3) physiologic stresses due to rapid growth rate and dietary habits; (4) incomplete development of metabolic defense mechanisms; and (5) greater sensitivity of developing systems.

Pregnant women and the fetus are at risk because of transplacental movement of lead to the fetus and the possibility of maternal complications at delivery. Because there is a balance between maternal blood lead levels and fetal blood lead levels, concern exists that development of the nervous system of the fetus may be impaired due to neurotoxicity of lead. Changes in fetal heme synthesis and premature births have been associated with prenatal exposure of the fetus to lead. However, available evidence does not indicate that pregnant women and the fetus would require a more stringent standard than young children.

Groups exposed to lead in the workplace also comprise a population at greater risk. Because members of such groups are generally healthy and do not have a greater physiological sensitivity to lead than young children, EPA believes that the protection of such groups does not require an air quality standard for lead more stringent than that for young children.

Other possible critically sensitive populations suggested in the Criteria Document include individuals with genetic conditions such as sickle cell disease. The Criteria Document cites a tentative association between the existence of sickle cell disease in children and increased risk of peripheral neuropathy due to lead exposure. Individuals suffering from iron deficiency or malnutrition may also be at greater risk from lead exposure. There is, however, insufficient data to determine the effects threshold for such groups or to accurately characterize such groups within the general population.

DETERMINING THE PIVOTAL ADVERSE HEALTH EFFECT

The toxic effects of lead resulting from high levels of exposure are well documented. Among the first effects noted historically were the severe and sometimes fatal consequences such as colic, palsy, and encephalopathy which followed acute occupational exposure in the mining and smelting industries. Exposure to high concentrations of lead in paints, inks, pesticides, and plumbing have similarly been implicated in cases of severe poisoning.

Recent widespread increase of lead in the environment as a result of human activities has stimulated research on the possible effects of the longer-term, low level exposure characteristic of the general populaion. Clinical and epidemiological studies have revealed that lead accumulates in the body throughout life, to a large extent immobilized in bone, but with a significant mobile fraction in the blood and soft tissues. Blood lead concentrations respond predictably to changes in the level of environmental exposure and, as a result, are generally accepted as good indicators of that exposure as well as of the internal dose of lead to which all body tissues are exposed. The threshold for a particular health effect is considered to be the blood lead level at which the effect is first detected.

The Criteria Document provides a ranking by blood lead threshold of the health effects observed in children.

Summary of health effects in children

Blood lead threshold in micrograms of lead per deciliter	Effect	Population group
10	ALAD inhibition.	Children and adults.
15 to 20	Erythrocyte protoporphyrin elevation.	Women and children.
40	Increased urinary ALA excretion.	Children and adults.
40	Anemia	Children.
40	Coproporphyrin elevation.	Adults and children.
50 to 60	Central nervous system (CNS) deficits.	Children.
50 to 60	Peripheral neuropathies.	Adults and children.
80 to 100	Encephalopathic symptoms.	Children.

ALAD INHIBITION

Inhibition of the enzyme aminolevulinic acid dehydratase (ALAD) represents the lowest level effect of lead that has been detected. The decreased activity of this enzyme, while observable, is not sufficient at blood leads at and below 10 μg Pb/dl to interfere with the step in heme synthesis which it mediates. Because no significant accumulation of precursors occurs at this level of exposure, ALAD inhibition of this degree is not regarded as a physiological impairment of the system. This effect becomes more significant at higher lead concentrations (40 μg Pb/dl) which reduce the activity of ALAD sufficiently to cause build-up of the precursor (ALA) in the urine.

ERYTHROCYTE PROTOPORPHYRIN ELEVATION

Above 15–20 μg Pb/dl, the Criteria Document notes a correlation between blood lead levels in children and the elevation of protoporphyrin in red blood cells. Unlike ALAD inhibition at 10 μg Pb/dl, the accumulation of erythrocyte protoporphyrin (EP) indicates a functional impairment of the heme synthetic pathway.

In regard to the implications for health of EP elevation, the Criteria Document provides the following description:

> Accumulation of photoporphyrin in the erythrocytes is the result of decreased efficiency of iron insertion into protoporhpyrin, the final step in heme synthesis which takes place inside the mitochondria. When this step is blocked by the effect of lead, large amounts of protoporhpyrin without iron accumulate in the erythrocyte, occupying the available heme pockets in hemoglobin.
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> The effect of lead on iron incorporation into protoporphyrin is not limited to the normoblast and/or to the hematopoietic system. Formation of the heme-containing protein, cytochrome-P450, which is an integral part of the liver mixed-function oxidase, may also be inhibited by lead. Accumulation of protoporphyrin in the presence of lead has been shown to occur also in cultured cells of chick dorsal root ganglion, indicating that inhibition of heme synthesis takes place in the neural tissue as well. These observations, and the fact that lead is known to disrupt the mitochondrial structure and function, indicate that the lead effect on heme synthesis is exerted on all body cells, possibly with different dose/response curves holding for effects in different cell types. On the other hand, it must be noted that increased levels of protoporphyrin in the erythrocyte reflect an accumulation of substrate and therefore imply a functional alteration of mitochondrial function in the same way that the increased urinary excretion of urinary δ-ALA implies impairment. In other words, if a "reserve" activity of ferrochelatase exists, such as has been suggested for δ-ALAD, accumulation of protoporphyrin in the erthrocytes indicates that this has been hampered by the lead effect to the point that the substrate is accumulated. For these reasons, as well as for its implication of the impairment of mitochondrial function, accumulation of protoporphyrin has been taken to indicate physiological impairment relevant to human health.

The remaining effects listed in the table present progressively greater health risks to susceptible individuals including anemia, the possibility of irreversible learning deficits, and lead encephalopathy.

EPA is proposing that lead-induced elevation in children of EP should be accepted as the pivotal adverse effect of lead. Accordingly, the air lead standard should be designed to prevent the occurrence of EP elevation in children. EPA bases its determination that EP elevation due to lead should be regarded as an adverse health effect on the following points:

1. EP elevation indicates an abnormal impairment of various cell functions, which should not be allowed to persist as a chronic condition.

2. The impairment of cellular function indicated by EP elevation extends to all body cells, and may have particular implications for the functioning of neural and hepatic tissues.

3. The air lead standard is intended to establish a level of airborne lead which can be regarded as consistent with protecting the health over a lifetime of exposure. The pervasive biological involvement of lead in the body, and its demonstrated impairment of biological functions are a strong impetus to the Agency in adopting the lowest threshold biological effect which can be considered adverse to health.

4. The Center for Disease Control has also used EP elevation as an indicator of undue lead exposure, although their guidelinees published in 1975 are ori-

ented to establishing an individual threshold for risk (30 μg Pb/dl) in populations of children exposed to high-dose lead sources such as lead-based paint rather than for establishing a safe mean population blood lead level with a margin of safety.

5. The Act intends that the air standard be precautionary. Taking the lowest adverse effect levels is compatible with the scientific uncertainty about the health consequences of prolonged low level lead exposure, and with the downward trend in levels of lead in the blood regarded as adverse to health by the public health community.

As an alternative to using elevation of EP as the pivotal health effect, EPA could take the position that EP elevation, while of concern to public health, is not sufficiently adverse to health, and that the standard should be based on the more severe effects such as anemia, or CNS deficits. EPA would welcome comments on whether what is known, or anticipated, about EP elevation or other subclinical effects has sufficient implications to warrant a role in determining the level of the standard.

DETERMINING A SAFE BLOOD LEAD LEVEL FOR PROTECTION OF THE SENSITIVE POPULATION

The third key area for judgment in the development of the proposed standard involves the determination of the mean population blood lead level for children at which EP elevation does not occur. EPA is proposing that this standard for lead be based on the judgment that the mean population blood lead for children not exceed 15 μg Pb/dl. This is the lowest value given in the Criteria Document as a threshold for the correlation of EP with blood lead level, based on studies by Roels (1976) and Piomelli (1977). On the basis of present knowledge, EPA believes that a population mean of 15 μg Pb/dl can be regarded as an indicator of a safe level of total lead exposure for children.

There are two reasons why the use of a blood lead target as an intermediate goal between air quality and EP levels is necessary. First, most of the scientific literature covered by the Criteria Document reports studies which link air lead with blood lead levels. Second, EP levels can be expected to respond to all sources of lead exposure; blood lead level serves as an indicator of total exposure.

In selecting 15 μg Pb/dl mean population blood lead as a target, EPA wishes to stress that it is proposing a statistical measure of population exposure. EPA is not suggesting that individual blood lead levels in excess of 15 μg Pb/dl necessarily constitute a significant risk to health. It can be expected that a population with a mean blood lead level of 15 μg Pb/dl will have individuals with higher and lower blood lead levels. There will also be a variation of EP levels for individuals with a given blood lead level. It is also true that the absence of statistical correlation of EP levels with blood lead levels below 15 μg Pb/dl does not necessarily mean that these lower blood lead levels are known to be without risk. However, the threshold of 15 μg Pb/dl does represent a point below which the sentitive population as a group has not been seen to show an elevation in EP due to lead and above which EP elevation has been demonstrated to rise with increasing implications for health. While other thresholds for EP elevation have been found (Sassa, 1973), EPA is using the lowest level cited in the Criteria Document in order to establish a margin of safety.

Alternatively, EPA could attempt to judge the actual level of EP elevation which represents an adverse effect on health, and then apply an adjustment for margin of safety. For example, in 1975, the Center for Disease Control established as a guideline for undue or increased lead absorption in children a blood lead level of 30 μg Pb/dl or EP levels of 60 μg/dl. The level of 30 μg Pb/dl in the blood represents some degree of health risk, but it is difficult to know whether any intermediate levels between 30 μg Pb/dl and 15 μg Pb/dl safeguard the public health.

EPA believes that elevations in individual blood levels and corresponding changes in EP levels are reversible, and may not in a single cycle constitute a serious physiological impairment. However, taken as a population average, underlying an environmental standard describing the safe limits for a lifetime of exposure, EPA is proposing that no elevation of EP associated with lead exposure should be seen as free from risk to the health of the sensitive population.

In establishing the target mean blood lead level for the sensitive population, EPA has used the lowest threshold for EP rather than attempt to use statistical techniques discussed in the Criteria Document in order to take into account the extent of individual variation in blood lead levels for a given level of exposure. The Criteria Document points out that data from epidemiological studies show that the log values of individual blood lead values in a uniformly-exposed population are normally distributed with a standard geometric deviation of 1.3 to 1.5. Using standard statistical techniques, it is possible to calculate the mean population blood lead level which would place a given percentage of the population below the level of an effects threshold. For example, a mean population blood lead level of 15μg Pb/dl would place 99.5% of a population of children below the Center for Disease Control guidelines of 30 μg Pb/dl.

EPA believes that variable response within the sensitive population should be taken into consideration in setting the level of the standard, but recognizes a number of problems in using the log-normal distribution in the case of the lead standard.

(1) The log-normal distribution describes the variable response of individuals' blood lead levels to air exposure. It can be expected that there is also a probability distribution associated with the elevation of EP among individuals with a given blood lead level. The parameters of this second probability distribution are not presented in the Criteria Document, but it is reasonable to expect that only a small percentage of those individuals just above the threshold blood lead level will experience EP elevation beyond what could be expected from the normal scatter of EP values around blood lead levels just below the threshold. The effect of using blood lead as an intermediary between air lead exposure and EP levels is to combine two probability distributions, one known and one unknown, between population blood values and EP elevation.

(2) There are a number of sources of variability in blood lead levels other than individual differences of response within a population group. These include variability from possible non-uniform exposure to lead in the populations studied and from analytical and process techniques used in measuring blood lead.

For these reasons, EPA believes that use of a log-normal correction may overestimate the degree to which the population mean should be below the threshold blood lead level. This is particularly true in dealing with the threshold for EP where considerable margin of safety results from selection of the target blood lead level at which slight EP elevation is first detected, rather than a level at which lead has had a substantial impact on EP levels.

DETERMINING THE RELATIONSHIP BETWEEN AIR LEAD EXPOSURE AND RESULTING BLOOD LEAD LEVEL

On the basis of clinical and epidemiological studies evaluated, the Criteria Document concludes:

> Evidence indicates that a positive relationship exists between blood and air lead levels, although the exact functional relationship has not yet been clarified. Available data indicate that in the range of air lead exposures generally encountered by the population, the ratio of the increase in blood lead per unit of air lead is from 1 to 2. It appears that the ratio for children is in the upper end of the range and that ratios for males may be higher than those for females.

The range of ratios for children's blood lead response to a one μg increase in air lead cited in the Criteria Document is from 1.2 to 2.3. The lower ratio comes from studies at Kellogg, Idaho, where dust levels of lead were separately correlated with blood lead. In view of the tendency of children to experience higher ratios due to greater intake and absorption of air lead, EPA has selected a ratio of 1:2 in calculating the impact of air lead levels on blood lead levels in children.

DETERMINING THE ALLOWABLE BLOOD LEAD INCREMENT FROM AIR

The fifth area of judgments made by EPA in developing the proposed standard for lead is related to an aspect of lead which has not characterized any pollutant previously addressed by EPA under Section 109 of the Clean Air Act: That significant amounts of the pollutant result from sources that are not subject to control by implementing an air quality standard.

Some studies reported in the Criteria Document clearly show that levels of lead in the blood derive from non-air sources. For example, studies in areas with minimal air lead levels still show significant levels of lead in the blood (Johnson, Tillery 1975). A study of children in Boston correlates blood lead levels with lead levels in water supplies (Worth, in press).

Other studies demonstrate a strong relationship of blood lead level with air lead. Clinical studies on adult volunteers in chamber studies demonstrate changes of blood lead with changes of the concentration of lead in the air (Griffin, et al., 1975). Epidemiological studies show a general pattern of urban-rural difference where blood lead levels are higher in urban settings where air lead levels are also higher. Other epidemiological studies directly correlate air lead with blood lead. These include studies using personal dosimeters to accurately gauge lead exposure (AZAR, 1975), and the extensive population studies conducted in the community around the smelter complex at Kellogg, Idaho (Yankel and von Lindern, 1977).

IMPLICATIONS OF MULTIPLE SOURCES OF LEAD IN SETTING AN AIR STANDARD

The implications of multiple sources of environmental lead are difficult to reconcile with the concept of a National Ambient Air Quality Standard. If the air were the only source of lead, it would be a reasonably straightforward matter to identify a safe level and to require that, regardless of what prevailing levels of air lead are today, the safe level be achieved. However, since non-air sources contribute lead as well, the level of an ambient air quality standard which will protect public health is affected by the contribution of these non-air sources. If their contribution is far below the allowable level of blood lead, the air contribution can be permitted to be relatively high. However, if they alone contribute more than the allowable blood lead level, even a zero ambient air quality standard would not prevent EP elevation in children.

EPA believes that it should assume some level of blood lead attributable to non-air sources in order to determine what the air lead contribution can be, and what the ambient air quality standard should be as a result. This calculation is complicated, however, by the fact that the non-air contribution to blood lead varies from time-to-time and place to place. As a result, the level selected as the basis for determining the allowable contribution from air and the resulting air quality standard becomes in part a policy choice reflecting how much of the lead pollution problem should be dealt with through control of air sources.

Because of the factors just discussed, no National Ambient Air Quality Standard can be assured of being protective in all locations. Regardless of what the non-air contribution is assumed to be, the air standard will be overprotective in areas where lead from non-air sources is low and underprotective in areas where it is high. EPA does not believe, however, that it is given the latitude to set area specific air quality standards under Section 109. EPA has, therefore, undertaken to make a single judgment as to what contribution to population blood levels derives from non-air sources. This single numerical value represents, in fact, what EPA proposes should be taken as a goal in limiting lead exposures from non-air sources. The level for non-air contribution used in this proposal is EPA's best judgment as to the appropriate level based partly on what is known about non-air lead contribution from a limited number of studies and partly on what EPA believes is an appropriate goal for air pollution control, consistent with the Agency's responsibility to protect the public health. The specific derivation of the goal for non-air contribution to mean population blood lead levels is described in the next section.

BASIS FOR EPA'S ESTIMATE OF CONTRIBUTION TO BLOOD LEAD LEVELS FROM NON-AIR SOURCES

The level of the standard is very strongly influenced by judgments made regarding the size of non-air contribution to total exposure. EPA has encountered difficulties in attempting to estimate exposure from various lead sources in order to determine the contribution of such sources to blood lead levels:

(1) Studies reviewed in the Criteria Document do not provide detailed or widespread information about relative contribution of various sources to young children. Estimates can only be made by inference from other empirical or theoretical studies, usually involving adults.

(2) It can be expected that the contribution to blood lead levels from non-air sources can vary widely, is probably not in constant proportion to air lead contribution, and in some cases may alone exceed the target mean population blood lead level.

In spite of these difficulties, EPA has attempted to assess available information in order to estimate the general contribution to population blood lead levels from air and non-air sources. This has been done with evaluation of evidence from general epidemiological studies, studies showing decline of blood lead levels with decrease in air lead, studies of blood lead levels in areas with low air lead levels, and isotopic tracing studies.

Studies reviewed by the Criteria Document show that mean blood lead levels for children are frequently above 15 μg Pb/dl. In studies reported, the range of mean population blood lead levels for children was from 16.5 μg Pb/dl to 46.4 μg Pb/dl with most studies showing mean levels greater than 25 μg Pb/dl (Fine, 1972; Landrigan, 1975; von Lindern, 1975). EPA believes that for most of these populations, the contribution to blood lead levels from non-air sources exceeds the desired target mean blood lead level.

In a number of studies, it is apparent that reduction in air lead levels results in a decline in children's blood lead levels. A study of blood lead levels in children in New York City showed that children's mean blood lead levels fell from 30.5 μg Pb/dl to 21.0 μg Pb/dl from 1970 to 1976, while during the same period air lead levels at a single monitoring site fell from 2.0 μg Pb/dl to 0.9 μg/Pb, (Billick, 1977). Studies at Omaha, Nebraska (Angle, 1977) and Kellogg, Idaho (Yankel, von Lindern, 1977) also show a drop in mean blood lead levels with declines in air lead levels. However, as air lead levels decline there appears to be a rough limit to the drop in blood lead levels. EPA has also examined epdemiological studies in the Criteria Document where air lead exposure is low, and can be assumed to be a minor contributor to blood lead. These studies provide an indication of blood lead levels resulting from a situation where non-air sources of lead are predominant.

Studies reporting blood lead levels in children exposed to moderate to low air lead levels

Investigator	Blood lead (in micrograms of lead per deciliter)	Air lead (in micrograms of lead per cubic meter)	Comment
Hammer, 1972	11.6	0.1	Children in Helena, Mont.
Angle, 1974	14.4	0.14	Suburban children ages 1 to 4 in Omaha.
Goldsmith, 1974	13.7	0.2-0.7	Children in Benecia, Calif.
	13.8	0.3-0.6	Children in Crocket, Calif.
Johnson, Tillery, 1975.	10.2	0.6	Female children—mean age 9 in Lancaster, Calif.

The range of mean blood lead levels in those studies is from 10.2 μg Pb/dl to 14.4 μg Pb/dl, with an average at 12.7 μg Pb/dl.

In addition to epidemiological investigations, EPA has reviewed studies that examine the source of blood lead by detecting characteristic lead isotopes. A study using isotopic tracing (Manton, 1977) suggests that for several adults in Houston, Texas, 7 to 41 percent of blood lead could be attributed to air lead sources. An earlier isotopic study (Rabinowitz, 1974) concluded that for two adult male subjects studied, approximately one-third of total daily intake of lead could be attributed to exposure to air lead levels of 1–2 μg Pb/m^3. While these results cannot be directly related to children, it is reasonable to assume that children may exhibit the same or higher percentages of air lead contribution to blood lead level because of a greater potential for exposure to indirect air sources, soil and dust.

From reviewing these areas of evidence, EPA concludes that:

1. In studies showing mean blood lead levels above 15 μg Pb/dl, it is probable that both air and non-air sources of lead contribute significantly to blood lead with

the possibility that contributions from non-air sources exceed 15 µg Pb/dl.

2. Studies showing a sustained drop in air lead levels show a corresponding drop in blood lead levels, down to an apparent limit in the range of 10.2 to 14.4 µg Pb/dl. These studies show the rough range of the lowest blood lead levels that can be attributed to non-air sources.

3. Isotopic tracing studies show air contribution to blood lead to be 7–41 percent in one study and about 33 percent in another study.

In considering this evidence, EPA notes that if, from the isotopic studies, approximately two-thirds of blood lead is typically derived from non-air sources, a mean blood lead target of 15 µg Pb/dl would attribute 10 µg Pb/dl to non-air sources. On the other hand, the average blood lead level from studies EPA believes to represent the least amount of blood attributable to non-air sources is 12.7 µg/Pb. In the absence of more precise information, EPA is proposing that the lead standard be based on the assumption that in general, 12 µg Pb/dl of the blood lead level in children is derived from lead sources unaffected by the lead air quality standard. EPA is aware that actual population blood lead levels, either individually or as a population mean, may exceed this benchmark. However, if EPA were to use a larger estimate of non-air contribution to blood lead, the result would be an exceptionally stringent standard, which would not address the principle source of lead exposure. Conversely, EPA believes that it should not adopt an estimate of non-air contribution below the level shown in available studies to be the lowetst mean blood lead level documented in the Criteria Document.

Because of the strong impact that adopting this goal for non-air sources has on the level of the standard, EPA welcomes information and judgments about the validity of the numerical value chosen for this factor, as well as views about alternative ways in which EPA could develop an air standard that takes into account other routes of exposure.

CALCULATION OF THE AIR STANDARD

EPA has calculated the proposed standard based on the conclusions reached in the previous sections:

1. Sensitive population: children, ages 1–5.
2. Health basis (lowest detectable adverse effect): elevation of erythrocyte protoporphyrin (*EP*).
3. Effect threshold in sensitive population: 15µg Pb/d1.
4. Assumer goal for contribution to blood lead from non-air sources: 12µg Pb/d1.
5. Allowable contribution to blood lead from air sources: 15µg Pb/d1–12µg *Pb/d1*=3µg Pb/d1.
6. Air lead concentration consistent with blood lead contribution from air sources:

$$3\ \mu g\ Pb/d1 \times \frac{1\ \mu g/m^3\ air}{2 \mu g/d1\ blood} = 1.5 \mu g\ Pb/m^3$$

SELECTION OF THE AVERAGING PERIOD FOR THE STANDARD

To be protective of human health, the averaging period for the lead standard should be chosen such that variations in exposure which cosld result in adverse effects do not occur unless the standard is exceeded. The averaging period is the length of time over which measured concentrations of air lead are averaged to obtain an air quality level which is compared to the standard level to determine if a violation of the standard has occurred.

Moderate increases in air lead levels have been shown to produce increases in blood lead levels in adults after seven weeks of exposure (Griffin, 1975). Because of the slow response of blood lead levels to increases in air lead levels, it is not probable that short-term peaks in air lead levels will cause adverse effects.

Based on available information, EPA has concluded that the averaging period for the lead standard be a calendar month, based on the average of 24-hour measurements. This period is somewhat shorter than the time observed for the adjustment of blood lead levels in adults to changes in air lead concentration because of the greater risk of exposure of young children.

MARGIN OF SAFETY

EPA believes that the recommended standard incorporates a sufficient margin to protect the public health and welfare from the adverse effects of lead exposure deriving from lead in the air. Margin of safety considerations have entered into the development of the standard in several key areas:

(1) The standard is based on protection of young children, a critically sensitive general subgroup within the population.

(2) The standard is based on the lowest threshold for the first adverse effect occurring with increasing blood lead levels in children: elevation of protoporphyrin in red blood cells at a blood lead level of 15 µg Pb/dl.

(3) In estimating the change in blood lead levels resulting from the change in air lead levels, EPA has selected a ratio at the protective end of the range provided in the Criteria Document.

IMPACT OF LEAD DUSTFALL ON BLOOD LEAD

The significance of dust and soil lead as indirect routes of exposure has been of particular concern in the case of young children. Play habits and mouthing behavior between the ages of one and five have led to the conclusion that greater potential may exist in these children for ingestion and inhalation of the lead available in dust and soil.

Studies reviewed in the Criteria Document indicate a correlation between soil and dust levels and childrens' blood lead levels in highly contaminated environments (Yankel and von Lindern, 1977; Barltrop, 1974; Galke, in press). The lead threshold for concern has been reported as 1,000 ppm in soil (Yankel and von Lindern, 1977); at exposures of 500 and 1,000 ppm soil the Document concludes that blood levels begin to increase. A two-fold increase in soil concentration in this range is predicted to result in a 3–6 percent rise in blood lead levels. Below 500 ppm soil, no correlation has been observed with blood lead levels.

The normal background for lead in soil is cited in the Criteria Document as 15 ppm. Due to human activities, the average levels in most areas of the U.S. are considerably higher. Soil studies conducted by EPA's Office of Pesticides Programs from 1974–1976 in 17 urban areas reported only 3 cities with arithmetic mean concentrations in excess of 200 ppm, with the highest value 537 ppm. Concentrations in the soils surrounding large point sources of lead emissions, or heavily-travelled roads, on the other hand, may reach several thousand ppm.

Because of the many factors involved, EPA is unable to predict the relationship between air lead levels, dustfall rates, and resulting soil accumulation. Complicating factors include: particle size distribution, rain-out, other meteorological factors, topographical features affecting deposition, and removal mechanisms.

EPA believes, however, that significant impacts on blood lead of soil and dust lead are mainly limited to areas of high soil concentration (in excess of 1,000 ppm) around large point sources and in major urban areas which also experience high air lead levels. Evidence suggests that soil lead levels in areas with air lead levels in the range of the proposed standard are well below the threshold for blood lead impact (Johnson, Tillery, 1975; Johanson, 1972; EPA, 1975 Air Quality Data and Soil Levels).

WELFARE EFFECTS

Available evidence cited in the Criteria Document indicates that animals do not appear to be more susceptible to adverse effects from lead than man nor do adverse effects in animals occur at lower levels of exposure than comparable effects in humans.

There is some evidence that atmospheric sources of lead may be injurious to plants. Lead is absorbed but not accumulated to any great extent by plants from soil. Lead is either unavailable to plants or is fixed in the roots and only small amounts are transported to the above ground portions. Lead may be deposited on the leaves of plants and present a hazard to grazing animals. Although some plants may be susceptible to lead in the natural environment, it is generally in a form that is largely non-available to them.

There is no evidence to indicate that ambient levels of lead result in significant damage to man-made materials. Effects of lead on visibility and climate are minimal.

Based on such data, EPA concludes that significant welfare effects associated with exposure to lead which would necessitate a secondary standard more restrictive than the primary standard have not been established. Therefore, the primary ambient air quality standard should protect against known and anticipated adverse effects on public welfare. A more restrictive secondary standard will not be established at this time.

ECONOMIC IMPACT ASSESSMENT

The Agency conducted a general analysis of the economic impact that might result from the implementation of lead emission control measures. This analysis pointed out that the categories of sources likely to be affected by control of lead emissions are primary lead and copper smelters, secondary led smelters, gray iron foundries, gasoline lead additive manufacturers, and lead storage battery manufacturers. This analysis further indicates that primary and secondary lead smelters, and copper smelters may be severely strained both technically and economically in achieving emission reductions that may be required in implementing the proposed air quality standard.

There are, however, uncertainties associated with evaluating the impact of attaining the standard. For smelters, foundries and battery plants, attaining the standard may require control of fugitive led emissions, i.e., those emissions escaping from process steps, other than emission from smoke stacks. Fugitive emissions are difficult to estimate, measure, or control and it is also difficult to predict their impact on air quality near the facility. From the information available to the Agency, it does appear that non-ferrous smelters may have great difficulty in achieving lead air quality levels consistent with the proposed standard in areas immediately adjacent to the smelter complex. While the possible impact of the standard on these facilities is of concern to EPA, and will be the subject of continuing studies and analysis, these impacts have not entered into determination of the level of the standard.

OTHER EPA REGULATIONS

In 1975, EPA promulgated the national interim primary drinking water regulation for lead. The standard was aimed at protecting children from undue lead exposure and limited lead to 0.05 milligrams per liter (mg/1) which was considered as low a level as practicable. In 1977, the National Academy of Sciences evaluated the interim drinking water standards and concluded that a no-observed-adverse health effect for lead cannot be set with assurance at any value greater than 0.025 mg/1. The Office of Water Supply is currently reviewing the need to revise the interim drinking water standard for lead.

Based on its toxicity, EPA included lead on its 1977 list of priority pollutants for which effluent guidelines will be developed by early 1979. Effluent guidelines for non-ferrous smelters, the major stationary source emitters of airborne lead, are being developed based on achievement of best available technology.

EPA's Office of Pesticide Programs has promulgated regulations based on toxicity of lead which require the addition of coloring agents to the pesticide lead arsenate and specify disposal procedures for lead pesticides. Use of lead in pesticides is a small and decreasing proportion of total lead consumption in the U.S.

The Resource Conservation and Recovery Act of 1976 through which EPA is to establish standards on how to treat, dispose, or store hazardous wastes, provides a means for specifying how used crankcase oil and other waste streams containing lead should be recycled or safely disposed of. At the present time, no regulatory actions related to wastes containing lead have been proposed.

EPA has regulations for reducing the lead content in gasoline to 0.5 grams/gallon by October 1, 1979, and regulations providing for leadfree gasoline required for cars equipped with catalytic converters and other vehicles certified for use of unleaded fuel. The former regulations are based on reducing exposure to airborne lead to protect public health. Other EPA actions which result in the reduction of airborne lead levels include ambient standards and State implementation plans for other pollutants such as particulate matter and sulfur dioxide and new source performance standards limiting emissions of such pollutants. Existing and new sources of particulate matter emissions generally use control techniques which reduce lead emissions as one component of particulate matter.

OTHER FEDERAL AGENCY REGULATIONS AND POSITIONS ON LEAD

The Occupational Safety and Health Administration proposed regulations in 1975 to limit occupational exposure to lead to 100 μg Pb/m^3, 8-hour time weighted average. The exposure limit was based on protecting against effects, clinical or subclinical, and the mild symptoms which may occur below 80 μg Pb/dl, providing an adequate margin of safety. The level of 100 μg Pb/m^3 is anticipated to limit blood lead levels in workers to a mean 40 μg Pb/dl and a maximum of 60 μg Pb/dl. OSHA is presently reviewing the latest information on lead exposure and health effects in preparation for promulgation of the workplace standard for lead.

The Department of Housing and Urban Development (HUD) has requirements for reducing human exposure to lead through the prevention of lead poisoning from ingestion of paint from buildings, especially residential dwellings. Their activities include (1) prohibition of use of lead-based paints on structures constructed or rehabilitated through Federal funding and on all HUD-associated housing; (2) notification of purchasers of HUD-associated housing constructed prior to 1950 that such dwellings may contain lead-based paint; and (3) research activities to develop improved methods of detection and elimination of lead-based paint hazards.

The Consumer Product Safety Commission (CPSC) promulgated regulations in September 1977 which ban (1) paint and other surface coating materials containing more than 0.06 percent lead; (2) toys and other articles intended for use by children bearing paint or other similar surface coating material containing more than 0.06 percent lead; and (3) furniture coated with materials containing more than 0.06 percent lead. These regulations are based on CPSC's conclusion that it is in the public interest to reduce the risk of lead poisoning to young children from ingestion of paint and other similar surface-coating materials.

The Food and Drug Administration adopted in 1974 a proposed tolerance for lead of 0.3 ppm in evaporated milk and evaporated skim milk. This tolerance is based on maintaining children's blood lead levels below 40 μg Pb/dl. FDA also has a proposed action level of 7 μg/ml for leachable lead in pottery and enamelware, although the exact contribution of such exposure to total human dietary intake has not been established.

The Center for Disease Control concluded in 1975 that undue or increased lead absorption exists when a child has confirmed blood lead levels 30–70 μg Pb/dl or an EP elevation of 60–189 μg Pb/dl except where the elevated EP level is caused by iron deficiency. This guideline is presently accepted by the scientific community but because of more recent data is being reevaluated.

STATE AIR QUALITY STANDARDS

Four states currently have lead air quality standards—California, Pennsylvania, Montana, and Oregon. California has the lowest standard of 1.5 μg Pb/m^3, 30-day average, which is based on limiting the portion of blood lead that is air derived to 5 percent if individual values are held to 30 μg Pb/dl or less. California concludes that this standard is consistent with restricting mean blood lead levels to less than 15 μg Pb/dl. Pennsylvania based their standard of 5.0 μg Pb/m^3, 30-day average on the health effects of absorbed lead and concluded that 50 μg/day of lead can be safely absorbed from the air. Assuming a daily respiration volume of 20 m^3 and a 50 percent absorption rate, a maximum of 5 $\mu g/m^3$ is allowed in the air. Montana's standard of 5.0 μg Pb/m^3, 30-day average, was adopted as a goal based on Pennsylvania's experience. Oregon has a standard of 3.0 μg Pb/m^3, 30-day average, which was based primarily on health effects data with some consideration of economic implications.

THE FEDERAL REFERENCE METHOD

The Federal Reference Method for Leda describes the appropriate techniques for determining the concentration of lead and its compounds measured as elemental lead in ambient air. The method is based on measuring the lead content of suspended particulate matter on glass fiber filters using high volume sampling. The lead is then extracted from the particulate matter using nitric acid with heat or ultrasonic energy; finally, the lead content is measured by atomic absorption spectrometry.

The method has received single laboratory evaluation using samples or airborne particulates collected at a number of locations. In addition, four other laboratories have conducted two abbreviated collaborative tests using particulate samples. All available precision and accuracy information from these tests is included in the proposed method. Additional methodological studies will be completed between this date and promulgation.

EPA does not anticipate changing the sampling method or analytical principle involved but may amend the final Federal Reference Method for Lead in any or all of the following ways:

1. Removal of some inherent judgment processes left to the individual analyst.

2. Inclusion of a third extraction procedure which uses aqua regia. This permits the analyst to extract more metals than just lead quantitatively thereby permitting him to analyze the same extract for more than one metal.

3. Although the atomic absorption principle was selected as the method of analysis, other analytical principles appear to be equally applicable and are currently being evaluated. These methods are flameless atomic absorption, optical emission spectrometry, and anodic stripping voltametry. These analytical principles may be included in the final method but probably will be handled via the "equivalent method" route.

PUBLIC PARTICIPATION

All interested persons are invited to comment on all aspects of the proposed standard and the Federal Reference Method. In particular, data, views and arguments are solicited on the level of the standard, and conclusions, assumptions, and calculations used by EPA in selecting that level. Comments should be submitted in duplicate to: Mr. Joseph Padgett, Strategies and Air Standards Division, MD-12, Research Triangle Park, N.C. 27711.

Dated: December 8, 1977.

DOUGLAS COSTLE,
Administrator.

The Agency proposes to amend 40 CFR Part 50 by adding the following:

§ 50.12 National primary and secondary ambient air quality standards for lead.

The national ambient air quality standards for lead and its compounds measured as elemental lead by a reference method based on Appendix G to this part, or by an equivalent method, are: 1.5 micrograms per cubic meter—monthly arithmetic mean.

(Sections 109 and 301(a) of the Clean Air Act as amended (42 U.S.C. 7409, 7601(a)).)

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APPENDIX G—REFERENCE METHOD FOR THE DETERMINATION OF LEAD IN SUSPENDED PARTICULATE MATTER COLLECTED FROM AMBIENT AIR

1. *Principle and Applicability.*

1.1 Ambient air suspended particulate matter is collected on a glass-fiber filter for 24 hours using a high volume air sampler.

1.2 Lead in the particulate matter is solubilized by extraction with nitric aid (HNO_3), facilitated by heat or ultrasonication.

1.3 The lead content of the sample is analyzed by atomic absorption spectrometry using an air-acetylene flame, the 283.3 or 217.0 nm lead absorption line, and the optimum instrumental conditions recommended by the manufacturer.

2. *Range, Sensitivity and Lower Detectable Limit.*

The values given below are typical of the methods capabilities. Absolute values will vary for individual situations depending on the type of instrument used, the lead line, and operating conditions.

2.1 Range. The typical range of the method is 0.03 to 7.5 μg Pb/m³ assuming an upper linear range of analysis of 15 μg/ml and an air volume of 2400 m³.

2.2 Analytical sensitivity. Typical sensitivities for a 1% change in absorption (0.0044 absorbance units) are 0.2 and 0.5 μg Pb/ml for the 217.0 and 283.3 nm lines, respectively.

2.3 Lower Detectable Limit (LDL). A typical LDL is 0.03 μg Pb/m³. This LDL is for the 217 nm line. The LDL for the 283.3 nm line will be somewhat higher. The above value was calculated by doubling the between laboratory standard deviation obtained for the lowest measurable lead concentration in a collaborative test of the method.[15] An air volume of 2400 m³ was assumed.

3. *Interferences.*

Two types of interferences are possible: chemical, and light scattering.

3.1 Chemical. Reports on the absence [1,2,3,4,5] of chemical interferences far outweigh those reporting their presence,[6] therefore, no correction for chemical interferences is given here. If the analyst suspects that the sample matrix is causing a chemical interference, the interference can be verified and corrected for by carrying out the analysis using the method of standard additions.[7]

3.2 Light Scattering. Non-atomic absorption or light scattering, produced by high concentrations of dissolved solids in the sample, can produce a significant interference, especially at low lead concentrations.[3] The interference is greater at the 217.0 nm line than at the 283.3 nm line. No interference was observed using the 283.3 nm line with a similar method.[1]

Light scattering interferences can, however, be corrected for instrumentally. Since the dissolved solids can vary depending on the origin of the sample, the correction may be necessary, especially when using the 217.0 nm line. Dual beam instruments with a continuum source give the most accurate correction. A less accurate correction can be obtained by using a non-absorbing lead line that is near the lead analytical line. Information on use of these correction techniques can be obtained from instrument manufacturers manuals.

If instrumental correction is not feasible, the interference can be eliminated by use of the ammonium pyrrolidinecarbodithioate-methylisobutyl ketone, chelation-solvent extraction technique of sample preparation.[8]

4. *Precision and Bias.*

4.1 The high-volume sampling procedure used to collect ambient air particulate matter has a between laboratory relative standard deviation of 3.7% over the range 80 to 125 μg/m³.[9] The following equations give the precision of lead measurements made on ¾" x 8" strips cut from exposed glass fiber filters using the hot extraction procedure.[15]

$x=1.73+0.01c$
$y-4.82+0.03c$

where:

x=within laboratory standard deviation, μg Pb/strip
y=between laboratory standard deviation, μg Pb/strip

c=measured lead concentration, μg Pb/strip

Similar information is being obtained for the ultrasonic extraction procedure.

4.2 Single laboratory experiments indicate that there is no significant difference in lead recovery between the hot and ultrasonic extraction procedures.[16]

5. *Apparatus.*

5.1 Sampling.

5.1.1 High volume sampler. Use and calibrate the sampler as described in reference 10.

5.2 Analysis.

5.2.1 Atomic Absorption Spectrophotometer. Equipped with lead hollow cathode or electrodeless discharge lamp.

5.2.1 Acetylene. The grade recommended by the instrument manufacturer should be used. Change cylinder when pressure drops below 50–100 psig.

5.2.1.2 Air. Filtered to remove particulate, oil and water.

5.2.2 Glassware. Class A borosilicate glassware should be used throughout the analysis.

5.2.2.1 Beakers. 30 and 150 ml. graduated, Pyrex.

5.2.2.2 Volumetric flasks. 100-ml.

5.2.2.3 Pipettes. To deliver 50, 30, 15, 8, 4, 2, 1 ml.

5.2.2.4 Cleaning. All glassware should be scrupulously cleaned. The following procedure is suggested. Wash with laboratory detergent, rinse, soak for 4 hours in 20% (w/w) HNO_3, rinse 3 times with distilled-deionized water, and dry in a dust free manner.

5.2.3 Hot plate.

5.2.4 Ultrasonication water bath, unheated. Commercially available laboratory ultrasonic cleaning baths of 450 watts or higher "cleaning power", i.e., actual ultrasonic power output to the bath have been found satisfactory.

5.2.5 Template. To aid in sectioning the glass-fiber filter. See Figure 1 for dimensions.

5.2.6 Pizza cutter. Thin wheel. Thickness <1 mm.

5.2.7 Watch glass.

5.2.8 Polyethylene bottles. For storage of samples. Linear polyethylene gives better storage stability than other polyethylenes and is preferred.

5.2.9 Parafilm "M".[1] American Can Co., Marathon Products, Nennah, Wis., or equivalent.

6. *Reagents.*

6.1 Sampling.

6.1.1 Glass fiber filters. The specifications given below are intended to aid the user in obtaining high quality filters with reproducible properties. These specifications have been met by EPA contractors.

6.1.1.1 Lead content. The absolute lead content of filters is not critical, but low values are, of course, desirable. EPA typically obtains filters with a lead content of <75 μg/filter.

It is important that the variation in lead content from filter to filter, within a given batch, be small.

6.1.1.2 Testing.

6.1.1.2.1 For large batches of filters (>500 filters) select at random 20 to 30 filters from a given batch. For small batches (<500 filters) a lesser number of filters may be taken. Cut one ¾" x 8" strip from each filter anywhere in the filter. Analyze all strips, separately, according to the directions in Sections 7 and 8.

6.1.1.2.2 Calculate the total lead in each filter as

$$F_b = \mu g\ Pb/ml \times \frac{100\ ml}{strip} \times \frac{12\ strips}{filter}$$

where:

F_b=Amount of lead per 72 in² of filter, micrograms.

6.1.1.2.3 Calculate the mean, $\overline{F}_b$, of the values and the relative standard deviation (standard deviation/mean × 100). If the relative standard deviation is high enough so that, in the analysts opinion, subtraction of $\overline{F}_b$ (Section 10.3), may result in a significant error in the μg Pb/m³, the batch should be rejected.

6.1.1.2.4 For acceptable batches, use the value of $\overline{F}_b$ to correct all lead analyses (Section 10.3) of particulate matter collected using that batch of filters. If the analyses are below the LDL (Section 2.3) no correction is necessary.

6.2 Analysis.

6.2.1 Concentrated (15.6 *M*) HNO_3. ACS reagent grade HNO_3 and commercially available redistilled HNO_3 has been found to have sufficiently low lead concentrations.

6.2.2 Distilled-deionized water. (D.I. water).

6.2.3 3 *M* HNO_3. Add 182 ml of concentrated HNO_3 to D.I. water in a 1 l volumetric flask. Shake well, cool, and dilute to volume with D.I. water. CAUTION: Nitric Acid Fumes Are Toxic. Prepare in a well ventilated fume hood.

6.2.4 0.45 *M* HNO_3 Add 29 ml of concentrated HNO_3 to D.I. water in a 1 l volumetric flask. Shake well, cool, and dilute to volume with D.I. water.

6.2.5 Lead Nitrate, $Pb(NO_3)_2$. ACS reagent grade, purity 99.0 percent. Heat for 4 hours at 120°C and cool in a desiccator.

6.3 Calibration standard.

6.3.1 Master standard, 1000 μg Pb/ml. Dissolve 1.598 g of $Pb(NO_3)_2$ in 0.45 *M* HNO_3 contained in a 1 l volumetric flask and dilute to volume with 0.45 *M* HNO_3. Store in a polyethylene bottle. Commercially available certified lead standard solutions may also be used.

7. *Procedure.*

7.1 Sampling. Collect samples for 24 hours using the procedure described in reference 10 with glass-fiber filters meeting the specifications in 6.1.1. Transport collected samples to the laboratory taking care to minimize contamination and loss of sample.

7.2 Sample Preparation.

7.2.1 Hot Extraction Procedure.

7.2.1.1 Cut a ¾"×8" strip from the exposed filter using a template and a pizza cutter as described in Figures 1 and 2. Other cutting procedures may be used.

Lead in ambient particulate matter collected on glass fiber filters has been shown to be uniformly distributed across the filter[1,3,11] suggesting that the position of the strip is unimportant. However, other studies[12,17] have shown that when sampling near a road-way lead is not uniformly distributed across the filter. Therefore, when sampling near a road way, additional strips at different positions within the filter should be analyzed.

7.2.1.2 Fold the strip in half twice and place in a 150-ml beaker. Add 15 ml of 3 *M* HNO_3 to cover the sample. The acid should completely cover the sample. Cover the beaker with a watch glass.

7.2.1.3 Pleace beaker on the hot-plate, contained in a fume hood, and boil gently for 30 min. Do not let the sample evaporate to dryness. Caution: Nitric Acid Fumes Are Toxic.

7.2.1.4 Remove beaker from the hot plate and cool to near room temperature.

7.2.1.5 Quantiatively transfer the sample as follows:

7.2.1.5.1 Rinse watch glass and sides of beaker with D.I. water.

7.2.1.5.2 Decent extract and rinsings into a 100-ml volumetric flask.

7.2.1.5.3 Add D.I. water to 40 ml mark on beaker, cover with watch glass, and set aside for a minimum of 30 minutes. This is a critical step and cannot be omitted since it allows the HNO_3 trapped in the filter to diffuse into the rince water.

7.2.1.5.4 Decent the water from the filter into the volumetric flask.

7.2.1.5.5 Rinse filter and beaker twice with D.I. water and add rinsings to volumetric flask until total volume is 80 to 85 ml.

7.2.1.5.6 Stopper flask and shake vigorously. Set aside for approximately 5 minutes or until foam has dissipated.

7.2.1.5.7 Bring solution to volume with D.I. water. Mix thoroughly.

7.2.1.5.8 Allow solution to settle for one hour before proceeding with analysis.

7.2.1.5.9 If sample is to be stored for subsequent analysis, transfer to a linear polyethylene bottle.

7.2.2 Ultrasonic Extraction Procedure.

7.2.2.1 Cut a ¾"×8" strip, fold and place in a beaker as described in Sections 7.2.1.1 and 7.2.1.2 except that a 30-ml beaker covered with Parafilm is used instead of a 150-ml beaker covered with a watch glass. The Parafilm should be placed over the beaker such that none of the Parafilm is in contact with water in the ultrasonic bath. Otherwise, rinsing of the Parafilm (Section 7.2.2.3.1) may contaminate the sample.

7.2.2.2 Place the beaker in the ultrasonication bath and operate for 30 minutes.

7.2.2.3 Quantitatively transfer the sample as follows:

7.2.2.3.1 Rinse Parafilm and sides of beaker with D.I. water.

7.2.2.3.2 Decant extract and rinsings into a 100-ml volumetric flask.

7.2.2.3.3 Add 20 ml D.I. water to cover the filter strip, cover with parafilm, and set aside for a minimum of 30 minutes. This is a critical step and cannot be omitted. The sample is then processed as in Sections 7.2.1.5.4 through 7.2.1.5.9.

NOTE.—Samples prepared by either procedure are now in 0.45 *M* HNO_3.

8. *Analysis.*

8.1 Set the wavelength of the monochromator at 283.3 or 217.0 mm. Set or align other instrumental operating conditions as recommended by the manufacturer.

8.2 The sample can be analyzed directly from the volumetric flask, or an appropriate amount of sample decanted into a sample analysis tube. In either case, care should be taken not to disturb the settled solids.

8.3 Aspirate samples, calibration standards and blanks (Section 9.2) into the flame and record the equilibrium absorbance.

8.4 Determine the lead concentration in μg Pb/ml, from the calibration curve, Section 9.3.

8.5 Samples that exceed the linear calibration range should be diluted with HNO_3 of the same concentration as the calibration standards and reanalyzed.

9. *Calibration.*

9.1 Working standard, 20 μg Pb/ml. Prepare by diluting 2.0 ml of Master standard (6.3.1) to 100 ml with 0.45 *M* HNO_3. Prepare daily.

9.2 Calibration standards. Prepare daily by diluting the working standard with 0.45 *M* HNO_3 as indicated below. Other concentrations may be used.

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[1] Mention of commercial products does not imply endorsement by the Environmental Protection Agency.

Volume of 20 µg/ml working standard, milliliter	Final volume, milliliter	Concentration in micrograms of lead per milliliter
0	100	0.0
1.0	200	.1
2.0	200	.2
2.0	100	.4
4.0	100	.8
8.0	100	1.6
15.0	100	3.0
30.0	100	6.0
50.0	100	10.0
100	100	20.0

9.3 Preparation of calibration curve. Since the working range of analysis will vary depending on which lead line is used and the type of instrument, no one set of instructions for preparation of a calibration curve can be given. Select at least six standards (plus the reagent blank) to cover the linear absorption range indicated by the instrument manufacturer. Measure the absorbance of the blank and standards as in Section 8.0. Repeat until good agreement is obtained between replicates. Plot absorbance (y-axis) versus concentration in µg Pb/ml (x-axis). Draw (or compute) a straight line through the linear portion of the curve. Do not force the calibration curve through zero.

To determine stability of the calibration curve, remeasure—alternately—one of the following calibration standards for every 10th sample analyzed: concentration $\leqq$ 1 µg Pb/ml; concentration $\leqq$ 10 µg Pb/ml. If either standard deviates by more than 5% from the value predicted by the calibration curve, recalibrate and repeat the previous 10 analyses.

10. *Calculation.*

10.1 Measured air volume. Calculate the measured air volume as

$$V_m = \frac{Q_i + Q_f}{2} \times T$$

where:

V_m=Air volume sampled (uncorrected), m^3,
Q_i=Initial air flow rate, m^3/min.
Q_f=Final air flow rate, m^3/min.
T=Sampling Time, min.

The flow rates Q_i and Q_f should be corrected to the temperature and pressure conditions existing at the time of orifice calibration as directed in addendum B of reference 10, before calculation of V_m.

10.2 Air volume at STP. The measured air volume is corrected to reference conditions of 760 mm Hg and 25°C as follows. The units are standard cubic meters, sm^3.

$$V_{STP} = V_m \times \frac{P_2 \times T_1}{P_1 \times T_2}.$$

V_{STP}=Sample volume, sm^3, at 760 mm Hg and 298° K.
V_m=Measured volume from 10.1.
P_2=Atmospheric pressure at time of orifice calibration, mm Hg.
P_1=760 mm Hg.
T_2=Atmospheric temperature at time of orifice calibration, °K.
T_1=298 °K.

10.3 Lead Concentration. Calculate lead concentration in the air sample.

$$C = \frac{(\mu g\ \mathrm{Pb/ml} \times 100\ \mathrm{ml/strip} \times 12\ \mathrm{strips/filter}) - \bar{F}_b}{V_{STP}}$$

where:

C=Concentration, µg Pb/sm^3.
µg Pb/ml=Lead concentration determined from Section 8.
100 ml/strip=Total sample volume.

$$12\ \mathrm{strips/filter} = \frac{\text{Useable filter area, } 7'' \times 9''}{\text{Exposed area of one strip, } \tfrac{3}{4}'' \times 7''}$$

$\bar{F}_b$=Lead concentration of blank filter, µg, from Section 6.1.1.2.3.
V_{STP}=Air volume from 10.2.

11. *Quality Control.*

¾″ x 8″ glass fiber strips containing 80 to 2,000 µg Pb/strip (as lead salts) and blank strips with zero Pb content should be used to determine if the method—as being used—has any bias. Quality control charts should be established to monitor differences between measured and true values. The frequency of such checks will depend on the local quality control program.

To minimize the possibility of generating unreliable data, the user should follow practices established for assuring the quality of air pollution data,[13] and take part in EPA's semi-annual audit program for lead analyses.

12. *Trouble Shooting.*

1. During extraction of lead by the hot extraction procedure, it is important to keep the sample covered so that corrosion products—formed on fume hood surfaces which may contain lead—are not deposited in the extract.

2. The sample acid concentration of 0.45 *M* should minimize corrosion of the nebulizer. However, different nebulizers may require lower acid concentrations. Lower concentrations can be used provided samples and standards have the same acid concentration.

3. Ashing of particulate samples has been found, by EPA and contractor laboratories, to be unnecessary in lead analyses by Atomic Absorption. Therefore, this step was omitted from the method.

4. Filtration of extracted samples, to remove particulate matter, was specifically excluded from sample preparation, because some analysts have observed losses of lead due to filtration.

13. *References.*

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16. To be published. EPA, QAB, EMSL, RTP, N.C. 27711

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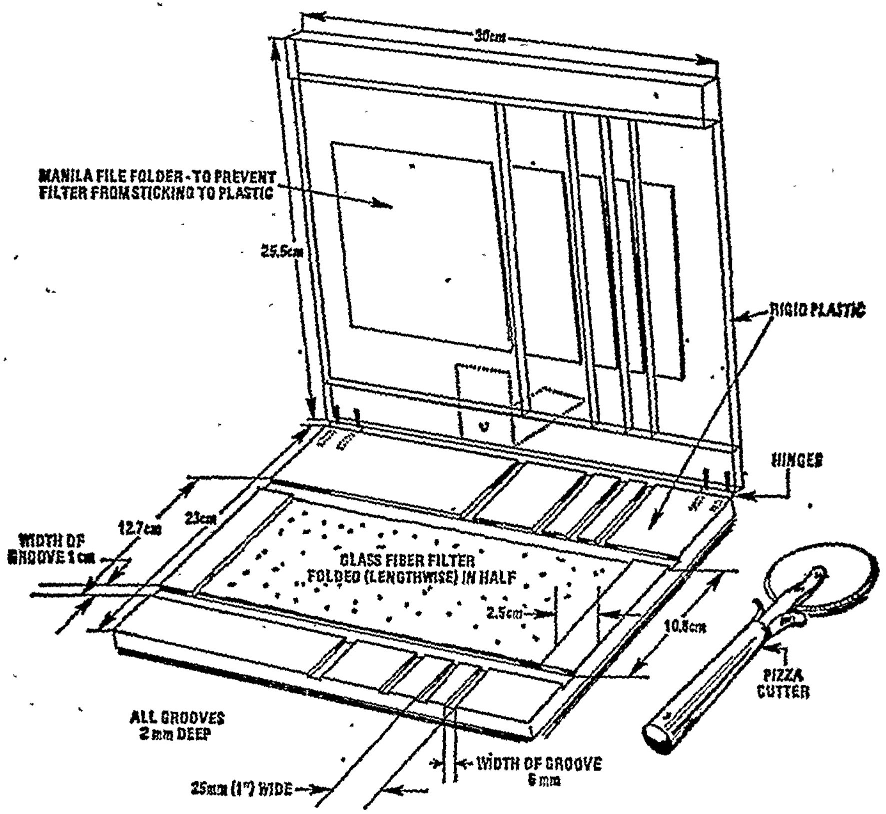

Figure 1

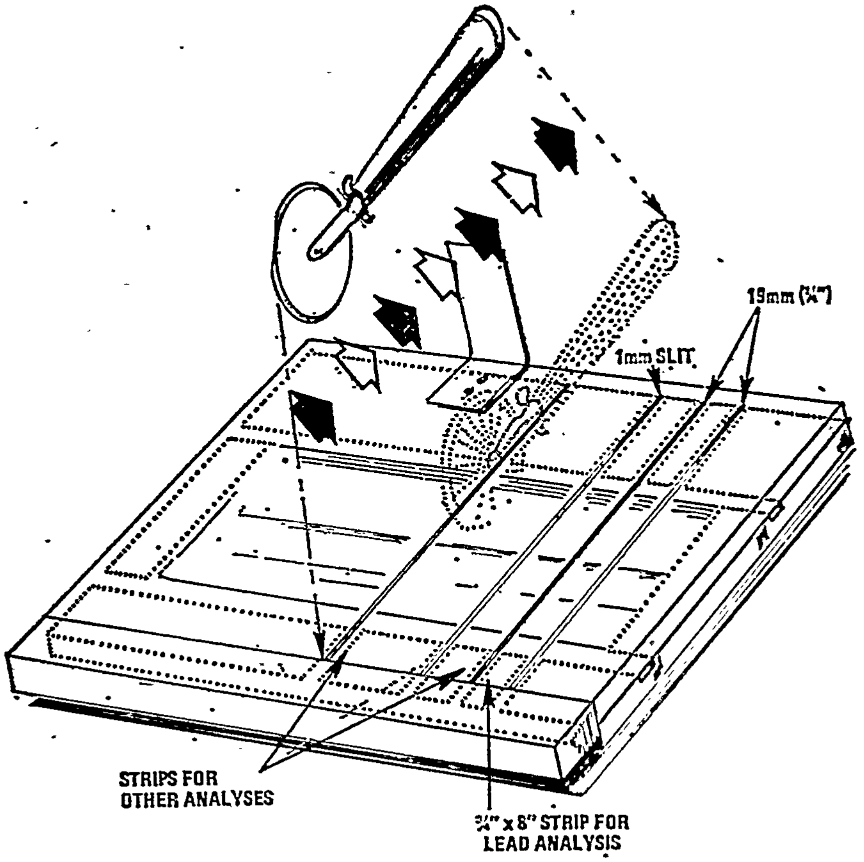

Figure 2

[FR Doc.77-35557 Filed 12-13-77;8:45 am]

[6560-01]

[40 CFR Part 51]

[FRL 821-5]

IMPLEMENTATION PLANS FOR LEAD NATIONAL AMBIENT AIR QUALITY STANDARD

AGENCY: Environmental Protection Agency.

ACTION: Proposed rulemaking.

SUMMARY: The regulations proposed below, together with the current requirements of 40 CFR Part 51, set forth the requirements for States to follow in developing, adopting and submitting acceptable implementation plans for the Lead national ambient air quality standards (NAAQS) proposed elsewhere in this FEDERAL REGISTER. The implementation plans are required under section 110 of the Clean Air Act.

Amendments to the existing regulations for implementation plans are necessary because lead differs from other pollutants for which the existing regulations were designed. The proposed amendments to 40 CFR Part 51 address the following topics:

Definitions of point sources and control strategy.
Control strategy requirements.
Air quality surveillance.

This preamble also discusses other issues concerning the development of lead implementation plans, including reporting requirements, emergency episode plans, and new source review.

DATES: Comments must be received on or before: February 17, 1978. Comments submitted in triplicate will facilitate internal distribution and public availability.

ADDRESSES: Persons may submit written comments on this proposal to: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Control Programs Development Division (MD 15), Research Triangle Park, N.C. 27711, Attention: Mr. Joseph Sableski.

EPA will make all comments received on or before February 17, 1978, available for public inspection during normal business hours at: EPA Public Information Reference Unit, 401 M Street SW., Room 2922, Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT:

Mr. John Silvasi, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Control Programs Development Division (MD 15), Research Triangle Park, N.C. 27711, telephone: Commercial—919-541-5437; FTS—629-5437.

SUPPLEMENTARY INFORMATION:

1. STATUTORY REQUIREMENTS

1.1 STATUTORY REQUIREMENTS AND SCHEDULE FOR ACTION

Under section 110 of the Clean Air Act, States must adopt and submit plans to EPA within nine months after the promulgation of a primary or secondary national ambient air quality standard. On the present schedule, EPA will promulgate the lead standard in June 1978. States must therefore submit their SIPs by March 1979. EPA must approve or disapprove the plan within four months after the date required for submission of the plan. If a State fails to submit a plan that complies with section 110, EPA must promulgate a plan for that State within six months after the date required for submission of the plan.

1.2 REQUIREMENTS FOR CONTENT OF THE PLAN

Section 110 of the Clean Air Act requires that a SIP provide for the attainment of primary ambient air quality standards within three years after the date on which EPA approves (or promulgates) the plan, and maintenance thereafter. EPA can grant an extension of the attainment date of up to two years under certain conditions. In addition, EPA cannot approve a plan unless it contains a number of other provisions; these are detailed in section 110 of the act.

It is important to note that the Act requires a plan for each criteria pollutant (i.e., one that the Administrator designates under section 108 and for which he establishes criteria and a standard under section 109 of the Clean Air Act). Therefore, the plan for lead will be a separate plan, not a revision to an existing plan. Many portions of the existing plans, however, such as those portions covering legal authority, compliance schedules and source surveillance, may be applicable to the implementation of the lead standard. The lead plan may incorporate those portions of existing plans by reference.

1.3 EXTENSIONS

Under section 110 of the Clean Air Act, the EPA Administrator may extend up to two years the three-year period for attainment of a primary standard.

The two-year extension to attain primary standards can be granted only upon application from the Governor of a State. Detailed requirements for the extension appear in section 110 of the act and Subpart C (Extensions) of 40 CFR 51.

2. EXISTING REGULATORY REQUIREMENTS AND NEED FOR REVISION

Regulations for the preparation, adoption, and submission of State implementation plans under section 110 of the

Clean Air Act, as amended, were published November 25, 1971 (36 FR 22369), codified as 40 CFR Part 51 and have been modified from time to time since then. The regulations represent an exercise of the agency's authority under section 301 of the act to prescribe regulations as necessary to carry out the functions assigned to EPA under the act. The regulations incorporate the basic requirements outlined in section 110 of the act, discussed above in section 1. When EPA first published these regulations, there were only six criteria pollutants: Particulate matter, sulfur oxides, carbon monoxide, hydrocarbons, photochemical oxidants, and nitrogen dioxide.

Elsewhere in this FEDERAL REGISTER, EPA is proposing a national ambient air quality standard for lead. EPA proposes to revise 40 CFR 51 to prescribe the minimum requirements that plans must meet for EPA approval. Portions of 40 CFR 51 that are not revised are still applicable to the lead plans as appropriate.

In addition, EPA will eventually promulgate requirements that account for the Clean Air Act Amendments of 1977. The new requirements that may affect lead implementation plans will cover the following topics:

Transportation-related provisions.
Accounting for stack heights.
Prevention of significant deterioration.
Permit requirements.
Indirect source review.
Interstate pollution abatement.
Consultation with governmental entities at the local and Federal level.
Permit fees.
Composition of State air pollution boards.
Provisions for public notification of dangers of air pollution.
Protection of visibility in certain areas.
Energy or economic emergency authority.

3. DISCUSSION OF PROPOSED REVISIONS

Portions of this section and the proposed rulemaking refer to a document entitled "Supplementary Guidelines for Lead Implementation Plans," which is now in draft form. Information on availability of that draft appears in § 4.3 of this preamble, below.

3.1 DEFINITIONS

3.1.1 *Definition of Lead Point Sources.* A point source is a facility that emits a significant quantity of air pollutant emissions. EPA is proposing that a point source of lead be defined as a source that emits five tons per year of lead or greater, without regard to the area in which it is located. Factors influencing the proposed point source definition include the air quality impact of such sources, and the number of sources that would be affected. A discussion of the determination of this definition appears in EPA's draft "Supplementary Guidelines for Lead Implementation Plans."[1]

3.1.2 *Definition of Control Strategy.* The proposal below would amend the definition of "control strategy" (§ 51.1(n)) to include regulation of fuels and fuel additives in the list of measures that could be considered control strategies.

Section 211(c)(4)(C) of the Clean Air Act authorizes States to regulate or prohibit the use of a fuel or fuel additive for motor vehicles through the State implementation plan. EPA can approve a State plan that contains such a regulation only if EPA "finds that the State control or prohibition is necessary to achieve the national primary or secondary ambient air quality standard which the plan implements." Lead in the form of tetramethyl lead or tetraethyl lead is widely used as an additive to gasolines to increase octane rating.

On September 28, 1976, EPA promulgated regulations that control the amount of lead in gasolines (41 FR 42675 as 40 CFR 80.20). These regulations require oil refiners to meet a lead in gasoline concentration of 0.8 gram per gallon by January 1, 1978, and 0.5 gram per gallon by October 1, 1979.

Also, the Clean Air Act Amendments of 1977 amended Section 211 of the Act to provide less stringent lead-in-gasoline limitations for small refineries.

In most urban areas without point sources of lead, the federal program for the reduction of lead in gasoline should sufficiently reduce lead emissions to the national standard for lead. There may be a few places, however, where the automobile emissions are so great that the federal program will not ensure the attainment of the standard. In those cases, States may wish to impose their own standards on the concentration of lead in gasoline under Section 211 of the Clean Air Act. EPA is proposing to list this as a possible measure in the definition of control strategy under § 51.1(n).

3.2 PRIORITY CLASSIFICATION SYSTEM

Section 51.3 currently defines a system for placing each air quality control region (AQCR) into priority classes based on the magnitude of its air pollution problem for several pollutants. This section will not apply to lead, since this proposal sets forth another means of setting priorities in the development of the control strategy.

3.3 REPORTING REQUIREMENTS

The requirements for quarterly air quality reporting specified in § 51.7(a) will apply to lead as well as the other criteria pollutants.

EPA plans to modify the requirements of § 51.7 for periodic emission reporting in 1978 and will address the reporting of lead emissions at that time. The following discussion outlines EPA's current thinking on this topic.

Currently § 51.7(b) requires that changes to the emission inventory be submitted in accordance with the requirements of the National Emission Data System (NEDS).[2] Data from many point sources of lead are already in the NEDS system because the lead sources are also sources of particular matter.

To minimize lead emission data collection and reporting requirements, EPA will use existing NEDS data together with emission factors from EPA's Hazardous and Trace Emissions System (HATREMS)[2] to calculate and store lead emissions data. The data from NEDS will be adequate to calculate emissions for most lead sources; HATREMS will also have the capability to store additional data for other sources that are not currently in NEDS (such as tetraethyl lead manufacturing) and to add new sources as necessary. Therefore, the lead emission reporting requirements will be based on the use of both NEDS and HATREMS. The regulation would require reporting on only point sources (i.e., those greater than five tons per year).

For the initial data submission, the States will be required (under a new Subpart E to 40 CFR Part 51 proposed below) to submit to the EPA Regional Office: (1) NEDS and HATREMS point source forms for all sources emitting five or more tons of lead per year and (2) an updated NEDS area source form and a HATREMS form for each county which must report. This submission should ensure a complete initial emission inventory.

3.4 CONTROL STRATEGY

A control strategy in an implementation plan is a set of measures developed to change the amount, timing, or distribution of emissions. An implementation plan must demonstrate that the control strategy is adequate to attain the standard within three years after EPA approval and maintain the standard thereafter. (States can receive an extension of up to two years to attain a primary standard, however.)

The regulations that EPA is proposing below pertaining to lead control strategies would appear as a separate new Subpart E.

3.4.1 *Requirements for Air Quality Maintenance Analyses and Plans.* Review of new and modified stationary sources of lead under 40 CFR 51.18 should be adequate to ensure maintenance of the national standard for lead in most areas. The regulations (40 CFR Part 51, Subpart D) requiring a detailed emissions projection analysis for the other criteria pollutants in selected areas were designed to require evaluation of the air quality impact of the growth of area sources that are not covered by the new source review provisions under § 51.18. The only area sources for lead are nonpoint process sources (those less than five tons per year), stationary fuel combustion sources, and mobile sources.

Non-point process sources will not likely jeopardize the maintenance of the lead standard. Using lead consumption as an indicator of production—and hence source emission activity—between 1971 and 1975 there was a net decrease in lead consumption of 9.4 percent for all lead products industries. Most categories had decreases in consumption. The only categories with increases were weights and ballast production (12.8 percent) and storage battery components manufacturing (2.8 percent).[3]

The stationary fuel combustion sources emit only minor quantities of lead.

Mobile sources, particularly automobiles, emit significant quantities of lead as a category, but EPA regulations for reduction of lead in gasoline have not yet been fully implemented. After the maximum reduction of lead in gasoline, growth in mobile sources will not jeopardize the proposed lead standard.

Section 51.12(h) requires States to provide for a system for acquiring information concerning growth in emissions. States must assess all areas at least every five years to determine if the State needs to revise the plan for any areas. The information-gathering mechanism and the periodic reassessments will uncover growth in sources too small to be reviewed under § 51.18.

The proposed regulations would allow EPA to require an analysis period beyond the statutory attainment date in those few areas where growth might jeopardize the national lead standard.

3.42. *Lead Emission Inventory.* EPA will assist the States in developing their initial lead emissions inventory by generating inventories based on data in NEDS and HATREMS described above under the reporting requirements. States will have to determine the degree of reliability of this data, however, and obtain additional data as warranted. The EPA-generated inventory can be supplemented by the State through the calculation of emissions using a State particulate matter inventory and the emission factors in "Control Techniques for Lead Air Emissions."[4] Where the State desires more accurate emission data from a particular source, the State should measure the lead emissions directly. EPA's recommended technique for measuring lead emissions appears in Appendix A of "Supplementary Guidelines for Lead Implementation Plan."[1]

In projecting emissions to 1982—the year by which the lead standard must be attained (unless extended)—States will have to account for the effect of the federal program for the phase-down of lead in gasoline. EPA's "Supplementary Guidelines for Lead Implementation Plans"[1] provide a technique for projecting mobile source lead emissions. Detailed procedures for projecting emissions for other source categories appears in EPA's "Guidelines for Air Quality Maintenance Planning and Analysis."[5]

3.4.3 *Lead Air Quality Analysis and Control Strategy Development.* The regulations proposed below are based on the following three-part approach:

First, the State would determine whether EPA's lead-in-gasoline limitation is sufficient to provide for attainment of the standard in areas in which high lead air concentrations have been measured, and that are affected primarily by mobile source lead emissions. This analysis would be restricted to those urbanized areas whose lead air concentrations exceeded 4.0 $\mu g/m^3$, monthly mean, measured since January 1, 1974. EPA derived this criterion from an analysis of the effects of three federal programs on reducing lead emissions: the program for the reduction of lead in gasoline under 40 CFR 80.20, the requirements (40 CFR 80.21 and 80.22) that prohibit the use of leaded gasoline in vehicles equipped with catalytic converters, and the requirements that set a lower limit on motor vehicle gasoline mileage under the Energy Policy and Conservation Act of 1975. EPA's analysis indicated that the effects of these programs are such that any area with 1976 lead concentrations that are caused predominantly by mobile sources and that are not in excess of 5.5 μ/m^3, monthly mean, will attain a standard of 1.5 $\mu g/m^3$ maximum monthly mean, by 1982, assuming no other changes in emissions. EPA's analysis appears as Appendix D to EPA's "Supplementary Guidelines for Lead Implementation Plans."[1] The criterion of 4.0 $\mu g/m^3$ incorporates a safety factor applied to the results of the analysis. EPA estimates that about seven urbanized areas would be covered under this criterion. Table 3 presents the list of these seven areas.

In the SIP analysis, the State would use a screening technique in the form of a modified rollback model[6] to determine when the federal programs for the reduction of lead in gasoline, for the use of no-lead gasoline in catalyst equipped cars, and for minimizing gasoline consumption will result in attainment of the standard. If the analysis shows that the standard will not be attained until after the statutory attainment dates, the plan would have to contain whatever measures are needed to attain the standard by the attainment dates.

Second, the State would then model the following point sources of lead regardless of measured air quality concentrations in their vicinities: primary lead smelters, secondary lead smelters, primary copper smelters, lead gasoline additive plants, lead-acid storage battery manufacturing plants that produce 1,200 or more batteries per day, and all other sources that emit 25 or more tons per year of lead. The State would have to use a dispersion model to estimate the impact of these sources on lead air concentrations. The State would develop and evaluate control strategies that would cover such sources if necessary.

These four source categories were selected based upon an analysis of their air quality impact. That analysis indicated that due to their fugitive emissions in the case of the smelters and the magnitude of their stack emissions in the case of lead gasoline additive plants and battery manufacturing plants, these source categories presented the potential for the greatest localized stationary source impacts.

Third, for each area in the vicinity of an air quality monitor that has recorded lead concentrations in excess of the lead national standard, the State would have to analyze the problem using modified rollback.

In so doing, the State would investigate sources of lead emissions other than ones covered in the first two parts above. Other sources include mobile-sources, smaller lead point sources, or categories of lead sources such as facilities that burn waste crankcase oil that contains lead.

The above strategy is in EPA's judgment adequate to quantify lead air problems for purposes of developing attainment strategies. It does not require the most sophisticated techniques for quantifying lead air quality problems, because State resources are at this time severely limited. If EPA required the most advanced techniques, few States would be able to submit acceptable analyses in a timely manner. A State that desires more detail in its analysis, however, should attempt more sophisticated analyses, such as modeling mobile and non-major sources using dispersion models and the generation of a lead emission inventory based upon measured emissions.

There may be source categories other than those specified in the second part of the above approach that have the potential for causing violations of the national standard for lead. EPA has identified gray iron foundries as one such source category, but this identification is based on limited data concerning the amount of fugitive emissions from the facilities. EPA does not feel that the degree of confidence in this identification justifies a requirement for States to analyze all gray iron foundries, of which over 1,000 exist. And because fugitive emissions may vary from facility to facility depending on factors other than production rate, it is difficult to arrive at a cut-off below which no such foundry need be analyzed. The State would, however, have to analyze those foundries located in areas that have measured lead concentrations in excess of the proposed standard. Because of the potential problems from foundries and other sources not covered by that approach, States are encouraged to consider analysis of these sources to the extent that time and resources permit.

For stationary sources whose particulate matter emissions are not normally well controlled and for stationary sources that generate a substantial amount of large particles, a State may wish to account for deposition or atmospheric fallout of large particles. States may use the methods found in Chapter 5 of "Meteorology and Atomic Energy 1968." The pertinent pages of that document are found in Appendix C of the "Supplementary Guidelines for Lead Implementation Plans."[1]

3.5 PREVENTION OF AIR POLLUTION EMERGENCY EPISODES

Because there is no evidence that exposure to short-term (hourly) peak lead levels in the ambient air could cause adverse health effects in any segment of the general population at levels that are ever likely to be experienced, an "emergency episode" for lead will remain undefined unless contradictory evidence is uncovered. For this reason, EPA does not intend to require States to adopt specific procedures to prevent emergency episodes as part of their lead implementation plans.

3.6 LEAD AIR MONITORING REQUIREMENTS

EPA is currently revising the air quality monitoring requirements to incorporate the recommendations of EPA's Standing Air Monitoring Work Group. These new requirements will cover all criteria pollutants—those for which EPA has published a criteria document and promulgated a national ambient air quality standard. So that persons interested in the requirements that pertain to lead implementation plans can review the lead monitoring proposal, however, EPA is proposing and will promulgate the lead monitoring requirements with the remainder of the lead regulations. These requirements will eventually be incorporated into the air quality monitoring requirements that will apply to all the criteria pollutants.

The regulations proposed below would require ambient monitoring for lead in urban areas. Lead emissions come predominately from mobile sources. EPA estimates that emissions from this category account for approximately 90 percent of total national emissions. Furthermore, most of these emissions occur in urban areas; hence the requirement for urban area monitoring.

A limited ambient monitoring program will be sufficient on a national basis to determine whether the limitation on lead in gasoline is resulting in the attainment and maintenance of the lead NAAQS. Thus, only relatively few monitors, compared to the number required for particulate matter, are needed in the major urban areas across the country on a permanent basis to develop an air quality trend data base.

3.6.1 *Urban Area Monitoring.* Permanent lead monitoring will be required only in the following areas:

Any urbanized area with a population greater than 500,000, or

Any urbanized area with lead concentrations equal to or in excess of 1.5 $\mu g/m^3$, maximum 30-day arithmetic mean, measured since January 1, 1974.

These criteria were selected to ensure that any area with the potential for exceeding the lead NAAQS, or that has already exceeded the NAAQS, would have to monitor ambient lead levels. An urbanized area with a population greater than 500,000 would be expected to have sufficient traffic density to pose a potential threat to the NAAQS.

Lists of areas that meet the above criteria are presented in Tables 1 and 2 below.

EPA recommends that States also monitor in smaller urban areas on an intermittent basis to determine their status with respect to the NAAQS. Such monitoring would be considered "Special Purpose Monitoring," in keeping with the terminology of the Standing Air Monitoring Work Group (SAMWG). States would have discretion in identifying the additional areas where monitoring will be conducted, selecting appropriate monitoring sites, and scheduling the time period over which the sampling will be conducted. EPA suggests several specified monitoring options: sampling during the course of every other year for five years until a trend is established, then sampling every third year, and sampling every year but over a 6 month time interval during the year. Each of these schemes would allow a State to use one monitor for at least two locations. If violations of NAAQS are found, permanent sites could be established. EPA recommends that urbanized areas greater than 100,000 in population be included in this supplemental monitoring program.

At least two monitors will be required as a minimum for urban area monitoring. The permanent sites established would be considered "National Air Quality Trend Stations" (NAQTS), in keeping with the terminology of the SAMWG. The minimum sampling frequency would be one sample every six days. Each EPA Regional Administrator would have the authority to specify more than two monitors, however, if he found that two monitors are insufficient to determine if the lead NAAQS were being attained and maintained. These additional monitors would be considered State and Local Air Monitoring Stations(SLAMS) in keeping with the terminology of the SAMWG.

The analysis of the 24-hour samples could be performed for either individual samples or composites of the samples collected over a calendar month. The sample analysis will use the Federal reference method, which EPA is proposing in 40 CFR Part 50 along with the NAAQS, or equivalent methods. The proposed reference method consists of the collection of the ambient sample using a high volume air sampler (hi-vol), with analysis for lead by atomic absorption.

Two types of monitoring sites will be needed as a minimum for urban area ambient lead monitoring—a roadway site and a neighborhood site. The objective of both site types is to measure in areas where people are being exposed to maximum lead concentrations in the ambient air. Both site types are needed to determine exposure of receptors to lead concentrations arising primarily from automotive sources and to determine the effect on air quality of the federal program for the reduction of lead in gasoline.

The roadway site would be located near residences that are in the vicinity of a major roadway (arterial, freeway, interstate, etc.) passing through a residential community or downtown center city area.

The neighborhood site would be located in an area of high density traffic and population, but not necessarily adjacent to major roadways. The preferred location for this site type would be at or near play areas or schools because of the seriousness of lead exposure for small children.

EPA's "Supplementary Guidelines for Lead Implementation Plans"[1] would specify the siting requirements for each of the site types.

Since the lead ambient air sampling method is the same as that for particulate matter, a State may designate existing particulate matter sites as lead monitoring sites if the stations meet the siting criteria of EPA's "Supplementary Guidelines for Lead Implementation Plans."[1]

3.6.2 *Point Source Monitoring.* The regulations would not require ambient monitoring around a lead source to determine whether the lead NAAQS is being achieved, but EPA encourages States to perform such monitoring, especially if the lead emissions are fugitive. A State may require point source owners and operators to monitor in the vicinity of their sources.

EPA also encourages States to monitor in locations where people with high blood lead levels work, reside, or play.

3.6.3 *Other Monitoring.* The proposed regulations would also provide for EPA to require monitors in areas outside the areas described in § 3.6.1, above.

3.7 REVIEW OF NEW SOURCES AND MODIFICATIONS

3.7.1 *New Stationary Sources.* EPA is not proposing modifications to the new source review requirements in the action below. Since this portion of the lead implementation plan requirements is part of a much larger issue, EPA believes that the new source review provisions for lead plans should be handled in a forthcoming separate action concerning new source review.

In the FEDERAL REGISTER of December 21, 1976 (41 FR 55558), EPA gave advance notice of a proposed revision to 40 CFR 51.18 concerning new source review. The notice indicated that EPA was considering the establishment of a system for reviewing new sources where the complexity of the review would depend on the size of the proposed source. The proposed regulations for new source review would establish two size criteria for new and modified lead sources. Below the lower limit, (emission of five tons per year) no new source review would be needed. Between the lower and higher limit (emissions of 25 tons per year), a review of the source for conformance with emission limitations would be needed, but no air quality analysis would be needed. Above the higher limit, an air quality analysis would be needed.

Lead point sources that are smaller than major lead sources (i.e., less than 25 tons per year) would not be subject to public comment requirements.

3.7.2 *Indirect Sources.* The Clean Air Act Amendments of 1977 prohibit EPA from requiring State Implementation Plans to contain a new source review program for indirect sources. Therefore, the proposed regulations would not require States to review new indirect sources.

3.7.3 *Significant Deterioration.* In the regulations proposed below, EPA has not proposed a definition of what is meant by significant deterioration with regard to lead.

Under the Clean Air Act Amendments of 1977, however, EPA must promulgate regulations for the prevention of significant deterioration for any pollutant for which EPA promulgates a new national ambient air quality standard. EPA must promulgate these regulations within two years after promulgation of the standard.

3.8 SOURCE SURVEILLANCE

EPA does not propose any changes to the regulations on source surveillance to account for the new lead standard therefore, States must follow the same requirements set forth therein for lead as for the other criteria pollutants.

The requirements for continuous monitoring of emissions will not be applied at this time to lead SIPs, however, because there are no in-stack lead monitors that measure both particulate and vaporous lead simultaneously. If such a monitor becomes available, EPA will then determine whether to require continuous in-stack lead monitors.

3.9 MISCELLANEOUS

In addition to the revisions discussed above, the proposal below contains several minor revisions that are necessary to differentiate certain regulations that apply only to lead from regulations that apply to other criteria pollutants.

4. ADDITIONAL GUIDANCE

4.1 SUPPLEMENTARY GUIDELINES

EPA has prepared a draft guideline, "Supplementary Guidelines for Lead Implementation Plans,"[1] that will cover aspects of the SIP development process not covered in the revisions to the SIP requirements. The items covered in the guideline are—

air quality data reporting details,
emissions data reporting details,
determining and accounting for background concentrations,
projecting automotive lead emissions,
new source review techniques,
methods for stack testing,
determination of lead point source definition, and
a discussion of deposition of particles and gases.

Comments on this draft are invited as part of this rulemaking. Information on how to obtain copies is given in § 4.3 below.

The document, "Control Techniques for Lead Air Emissions,"[4] also contains technical information that States can use in developing their analyses and control strategies. Included in the document is information about—

Processes that produce lead emissions,
Techniques applicable for control of lead emissions from both statutory and mobile sources and their costs,
Lead emission factors,
Effect of TSP controls on lead missions, and
Particle size distribution of lead emissions from most source categories (this information may be needed to operate dispersion models that account for particle deposition).

4.2 EXAMPLE LEAD CONTROL STRATEGY

To assist the States in developing implementation plans for the proposed lead air quality standard, EPA is developing an example lead control strategy. The example is scheduled for completion in March 1978 and will be made available through the OAQPS Guideline Series.

4.3 AVAILABILITY OF REFERENCES

EPA will make the "Supplementary Guidelines for Lead Implementation Plans" available to the State and local air pollution control agencies through the EPA Regional Offices. A list of these offices and appropriate persons to contact are presented below.

Ms. Ruth Seidman, Librarian, EPA, Region I, John F. Kennedy Federal Building, Room 2302, Boston, Mass. 02203.
Mr. H. Luger, Librarian, EPA, Region II, Federal Office Building, 26 Federal Plaza, New York, N.Y. 10007.
Ms. Wiley, Librarian, EPA, Region III, Curtis Building, Sixth and Walnut Streets, Philadelphia, Pa. 19106.
Ms. Barbara Fields, Air and Hazardous Materials Division, EPA, Region IV, 345 Courtland, NE., Atlanta, Ga. 30308.
Ms. Lou W. Tilley, Librarian, EPA, Region V, 230 South Dearborn Street, Chicago, Ill. 60604.
Ms. Dee Crawford, Librarian, EPA, Region VI, First International Building, 1201 Elm Street, Dallas, Tex. 75201.
Ms. Connie McKenzie, Librarian, EPA, Region VII, 1735 Baltimore Avenue, Kansas City, Mo. 64108.
Ms. Dianne Grah, Librarian, EPA, Region VIII, 1860 Lincoln Street, Denver, Colo. 80203.
Ms. Jean Circiello, Librarian, EPA, Region IX, 215 Fremont Street, San Francisco, Calif. 94105.
Ms. Arvella J. Weir, Librarian, EPA, Region X, 1200 Sixth Avenue, Seattle, Wash. 98101.

A copy of most reference material cited herein is available for public inspection at these Regional Offices. A copy of all reference material cited herein is available for public inspection at the EPA Public Information Reference Unit, the address of which is at the beginning of this preamble. In addition, there will be a number of additional copies of the draft "Supplementary Guidelines for Lead Implementation Plans" available for distribution to members of the general public. Persons who desire a copy may write or call—

U.S. Environmental Protection Agency
Public Information Center (PM 215)
401 M Street, SW.
Washington, D.C. 20460
Telephone: 202-755-0707

5. ENVIRONMENTAL AND ECONOMIC IMPACT

EPA has conducted studies of the environmental and economic impacts of implementing a national ambient air quality standard for lead. Copies of EPA's draft environmental and economic impact studies may be obtained from:

Mr. Joseph Padgett, Director
Strategies and Air Standards Division
U.S. Environmental Protection Agency
Research Triangle Park, N.C. 27711
Telephone: 919-541-5204

5.1 ENVIRONMENTAL IMPACT

The principal environmental impact of setting and implementing the lead standard will be the reduction of airborne levels of lead and reversal over time of the present trend of accumulation of lead in natural eco-systems, principally soil and sediments. Reduction of lead emissions will also result in reduction of emissions of particulate matter and other metals at sources requiring control.

5.2 ECONOMIC AND INFLATION EFFECTS

The Environmental Protection Agency has determined that this document contains a major proposal requiring preparation of an Economic Impact Analysis under Executive Orders 11821 and 11949 and OMB Circular A-107 and certifies that an Economic Impact Analysis has been prepared.

Economic impacts will result primarily from control of lead emissions from primary lead and copper smelters, secondary lead smelters, gray iron foundries, gasoline lead additive manufacturers, and lead-acid storage battery manufacturers.

6. REFERENCES

1. Supplementary Guidelines for Lead Implementation Plans. Draft. For information on availability for review, see section 4.3, above.

2. AEROS Users Manual, Vol. II, U.S. Environmental Protection Agency, Office of Air and Waste Management, Office of Air Quality Planning and Standards, Research Triangle Park, N.C. 27711. EPA 450/2-76-029 (OAQPS No. 1.2-039). December 1976.

3. Lead Industry in May 1976. Mineral Industry Surveys. U.S. Department of Interior. Bureau of Mines. Washington, D.C. August 5, 1976.

4. Control Techniques for Lead Air Emissions. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, N.C. November 1977.

5. Guidelines for Air Quality Maintenance Planning and Analysis, Volume 7: Projecting County Emission. Second Edition. EPA 450/4-74-008. U.S. Environmental Protection Agency, Research Triangle Park, N.C. 27711. January 1975.

6. deNevers, N.H., and J. R. Morris. Rollback Modeling—Basic and Modified. Reprint 73-139. Presented at the Air Pollution Control Association Annual Meeting, Chicago, Ill. June 1973.

TABLE I.—*Urbanized areas*[1] *greater than 500,000 population (1970 census*[2]*)*

AQCR No.:	*Area*
043	New York, N.Y.-Northeastern New Jersey
024	Los Angeles-Long Beach, Calif.
067	Chicago, Ill.-Northwestern Indiana
045	Philadelphia, Pa.-N.J.
123	Detroit, Mich.
030	San Francisco-Oakland, Calif.
119	Boston, Mass.
047	Washington, D.C.-Md.-Va.
174	Cleveland, Ohio
070	St. Louis, Mo.-Ill.
197	Pittsburgh, Pa.
131	Minneapolis-St. Paul, Minn.
216	Houston, Texas
115	Baltimore, Md.
215	Dallas, Texas
239	Milwaukee, Wis.

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[1] As defined in U.S. Bureau of the Census, "1970 Census Users' Guide;" U.S. Government Printing Office, Washington, D.C., 1970 (p. 83).

[2] U.S. Bureau of Census, "U.S. Census of Population: 1970; Number of Inhabitants; Final Report PC(1)-A1; United States Summary. U.S. Government Printing Office, Washington, D.C., 1971.

AQCR No.:	Area
229	Seattle-Everett, Wash.
050	Miami, Fla.
029	San Diego, Calif.
056	Atlanta, Ga.
079	Cincinnati, Ohio-Ky.
094	Kansas City, Mo.
162	Buffalo, N.Y.
036	Denver, Colo.
030	San Jose, Calif.
106	New Orleans, La.
015	Phoenix, Ariz.
193	Portland, Ore.-Wash.
080	Indianapolis, Ind.
120	Providence-Pawtucket-Warwick, R.I.-Mass.
176	Columbus, Ohio
217	San Antonio, Texas
078	Louisville, Ky.-Ind.
173	Dayton, Ohio
215	Fort Worth, Texas
223	Norfolk-Portsmouth, Va.
018	Memphis, Tenn.-Miss.
028	Sacramento, Calif.
050	Ft. Lauderdale-Hollywood, Fla.
160	Rochester, N.Y.
033	San Bernardino-Riverside, Calif.
184	Oklahoma City, Okla.
004	Birmingham, Ala.
174	Akron, Ohio
049	Jacksonville, Fla.
042	Springfield - Chicopee - Holyoke, -Mass.-Conn.

TABLE 2. *Urbanized areas with lead air concentrations exceeding or equal to 1.5 $\mu g/m^3$, maximum monthly mean (1975)*

AQCR No.:	Area
004	Birmingham, Ala.
003	Gadsden, Ala.
007	Huntsville, Ala.
005	Mobile, Ala.
005	Jackson, Miss.
002	Montgomery, Ala.
009	Fairbanks, Alaska
015	Phoenix, Ariz.
015	Tucson, Ariz.
031	Fresno, Calif.
024	Los Angeles, Calif.
028	Sacramento, Calif.
033	San Bernardino, Calif.
029	San Diego, Calif.
030	San Francisco, Calif.
030	San Jose, Calif.
036	Denver, Colo.
043	Bridgeport, Conn.
043	Paterson, N.J.
043	New York City, N.Y.
042	New Haven, Conn.
042	Waterbury, Conn.
042	Springfield, Mass.
045	Wilmington, Del.
045	Trenton, N.J.
045	Philadelphia, Pa.
047	Washington, D.C.
049	Jacksonville, Fla.
052	Tampa-St. Petersburg, Fla.
067	Chicago, Ill.
067	Gary, Ind.
065	Peoria, Ill.
076	Muncie, Ind.
069	Davenport, Iowa
092	Des Moines, Iowa
103	Huntington, Ky.
102	Lexington, Ky.
078	Louisville, Ky.
120	Providence, R.I.
123	Detroit, Mich.
122	Grand Rapids, Mich.
131	Minneapolis, Minn.
094	Kansas City, Mo.
070	St. Louis, Mo.
085	Omaha, Nebr.
013	Las Vegas, Nev.
148	Reno, Nev.
158	Utica, N.Y.
167	Charlotte, N.C.
166	Durham, N.C.
165	Winston-Salem, N.C.
176	Columbus, Ohio
184	Oklahoma City, Okla.
193	Portland, Oreg.
151	Allentown, Pa.
151	Scranton, Pa.
196	Lancaster, Pa.
244	San Juan, P.R.
200	Columbia, S.C.
202	Greenville, S.C.
055	Chattanooga, Tenn.
207	Knoxville, Tenn.
018	Memphis, Tenn.
214	Corpus Christi, Tex.
215	Dallas, Tex.
153	El Paso, Tex.
216	Houston, Tex.
222	Lynchburg, Va.
233	Norfolk, Va.
229	Seattle, Wash.
234	Charleston, W. Va.

SOURCE: Data from EPA's Environmental Monitoring Support Laboratory, Statistical and Technical Analysis Branch.

TABLE 3.—*Urbanized areas with lead air concentrations equal to or exceeding 4.0$\mu g/m^3$, maximum monthly mean (1975)*

ACQR No.:	Area
15	Phoenix, Ariz.
24	Los Angeles, Calif.
29	San Diego, Calif.
67	Chicago, Ill.
115	Baltimore, Md.
197	Pittsburgh, Pa.
218	San Antonio, Tex.

SOURCE: Data from EPA's Environmental Monitoring Support Laboratory, Statistical and Technical Analysis Branch.

Dated: December 8, 1977.

DOUGLAS COSTLE,
Administrator.

It is proposed to amend 40 CFR Part 51 as follows:

1. In § 51.1, paragraph (k) is revised and paragraph (n) is amended by adding subdivision (11) as follows:

§ 51.1 Definitions.

* * * * *

(k) "Point source" means the following:

(1) For particulate matter, sulfur oxides, carbon monoxide, hydrocarbons, and nitrogen dioxide—

(i) Any stationary source causing emissions in excess of 90.7 metric tons (100 tons) per year of the pollutant in a region containing an area whose 1970 "urban place" population, as defined by the U.S. Bureau of the Census, was equal to or greater than one million;

(ii) Any stationary source causing emissions in excess of 22.7 metric tons (25 tons) per year of the pollutant in a region containing an area whose 1970 "urban place" population, as defined by the U.S. Bureau of the Census was less than one million; or

(iii) Without regard to amount of emissions, stationary sources such as those listed in Appendix C to this part.

(2) For lead, any stationary source causing emissions in excess of 4.54 metric tons (five tons) per year.

* * * * *

(n) * * *

(11) Control or prohibition of a fuel or fuel additive used in motor vehicles.

* * * * *

2. Section 51.12, paragraph (e) is amended by adding paragraph (3) as follows:

§ 51.12 Control strategy: General.

* * * * *

(e) * * *

(3) This paragraph covers only plans to attain and maintain the national standards for particulate matter, sulfur oxides, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide.

* * * * *

3. Section 51.17 is amended by (1) revising the heading to read "Air quality surveillance: Particulate matter, sulfur oxides, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide," and (2) adding paragraph (d) as follows:

§ 51.17 Air quality surveillance: Particulate matter, sulfur oxides, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide.

* * * * *

(d) This section covers only plans to attain and maintain the national standards for particulate matter, sulfur oxides, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide.

4. A new section 51.17b is added as follows:

§ 51.17b Air quality surveillance: Lead.

(a) The plan must provide for the establishment of at least two permanent lead ambient air quality monitors in each urbanized area (as defined by the U.S. Bureau of the Census)—

(1) That has a 1970 population greater than 500,000; or

(2) Where lead air quality levels currently exceed or have exceeded 1.5 $\mu g/m^3$ monthly arithmetic mean measured since January 1, 1974.

(b) The monitors must be operated on a minimum sampling frequency of one 24-hour sample every six days.

(c) The sampling network described in the plan must contain at least one roadway type monitoring site and at least one neighborhood site and be sited in accordance with the procedures specified in EPA's "Supplementary Guidelines for Lead Implementation Plans."

(d) The two sites will be part of the "National Air Quality Trends Stations" (NAQTS).

(e) The Regional Administrator may specify more than two monitors if he finds that two monitors are insufficient to adequately determine if the lead standard is being attained and maintained. He may also specify monitors in areas outside the areas covered in paragraph (a) of this section. These additional monitors will be part of the "State and Local Air Monitoring Stations" (SLAMS).

(f) The plan must include a description of the proposed sampling sites.

(g) The following elements of the monitoring system must follow 40 CFR Part 50:

(1) The type of monitor.

(2) The procedures for operating the monitor.

(3) The procedures for analysis of the samples collected from the monitors.

(h) Existing sampling sites being used for sampling particulate matter may be designated as sites for sampling lead if they meet the siting criteria of "Supplementary Guidelines for Lead Implementation Plans".

(i) The plan must provide that all lead air quality samplers will be established and operational as expeditiously as practicable but no later than two years after the date of the Administrator's approval of the plan.

(j) The analysis of the 24-hour samples may be performed for either individual samples or composites of the samples collected over a calendar month.

5. A new subpart E is added as follows:

Subpart E—Control Strategy: Lead

Sec.

AUTHORITY: Secs. 110 and 301(a), Clean Air Act amended (42 U.S.C. 7410, 7601).

Subpart E—Control Strategy: Lead

§ 51.80 Demonstration of attainment.

(a) Each plan must contain a demonstration that the standard will be attained and maintained in the following areas:

(1) Areas in the vicinty of the following point sources of lead:

(i) Primary lead smelters.
(ii) Secondary lead smelters.
(iii) Primary copper smelters.
(iv) Lead gasoline additive plants.
(v) Lead-acid storage battery manufacturing plants that produce 1200 or more batteries per day.
(vi) Any other stationary source that emits 25 or more tons per year of lead or lead compounds.

(2) Any other area that has lead air concentrations in excess of the national standard for lead, measured since January 1, 1974.

(b) The plan must demonstrate that the measures, rules, and regulations contained in the plan are adequate to provide for the attainment of the national standard for lead within the time prescribed by the Act and for the maintenance of that standard for a reasonable period thereafter.

(c) The plan must include the following:

(1) A summary of the computation, assumptions, and judgments used to determine the reduction of emissions or reduction of the growth in emissions that will result from the application of the control strategy.

(2) A presentation of emission level expected to result from application of each measure of the control strategy.

(3) A presentation of the air quality levels expected to result from application of the overall control strategy presented either in tabuler form or as an isopleth map showing expected maximum concentrations.

§ 51.81 Emissions data.

(a) The plan must contain a summary of the baseline lead emission inventory based upon measured emissions or, where measured emissions are not available, documented emission factors. The point source inventory on which the summary is based must contain all sources that emit five or more tons of lead per year. The inventory must be summarized in a form similar to that shown in Appendix D.

(b) The plan must contain a summary of projected lead emissions for—

(1) at least three years from the date by which EPA must approve or disapprove the plan if no extension under section 110(e) of the Clean Air Act is granted;

(2) at least five years from the date by which EPA must approve or disapprove the plan if an extension is requested under section 110(e) of the Clean Air Act; or

(3) any other longer period if required by the Administrator.

(c) The plan must contain a description of the method used to project emissions.

(d) The plan must contain an identification of the sources of the data used in the projection of emissions.

§ 51.82 Air quality data.

(a) The plan must contain a summary of all lead air quality data measured since January 1974. The plan must include an evaluation of the data for reliability, suitability for calibrating dispersion models (when such models will be used), and representativeness. Where possible, the air quality data used must be for the same baseline year as for the emission inventory.

(b) If additional lead air quality data are desired to determine lead air concentrations in areas suspected of exceeding the lead national ambient air quality standard, the plan may include data from any previously collected filters from particulate matter high volume samplers. In determining the lead content of the filters for control strategy demonstration purposes, a State may use methods other than the reference method, such as X-ray fluorescence.

(c) The plan must also contain a tabulation of, or isopleth map showing, maximum air quality concentrations based upon projected emissions.

§ 51.83 Certain urbanized areas.

For urbanized areas with measured lead concentrations in excess of 4.0 $\mu g/m^3$, monthly mean measured since January 1, 1974, the plan must employ the modified rollback model for the demonstration of attainment as a minimum, but may use an atmospheric dispersion model if desired.

§ 51.84 Areas around significant point sources.

(a) The pan must contain a calculation of the maximum lead air quality concentrations and the location of those concentrations resulting from the following point sources for the demonstration of attainment:

(1) Primary lead smelters.
(2) Secondary lead smelters.
(3) Primary copper smelters.
(4) Lead gasoline additive plans.
(5) Any other stationary source that emits 25 or more tons per year of lead or lead compounds.

(b) In performing this analysis, the State shall use an atmospheric dispersion model.

§ 51.85 Other areas.

For each area in the vicinity of an air quality monitor that has recorded lead concentrations in excess of the lead national standard, the plan must employ the modified rollback model as a minimum, but may use an atmospheric dispersion model if desired for the demonstration of attainment.

§ 51.86 Data bases.

(a) For interstate areas, the analysis from each constituent State must, where practicable, be based upon the same regional emission inventory and air quality baseline.

(b) Each State shall submit to the appropriate Regional Office with the plan, but not as part of the plan, emissions data and information related to emissions as identified by the following:

(1) The National Emission Data System (NEDS) point source coding forms for all lead point sources, and area source coding forms for all lead sources that are not lead point sources.

(2) The Hazardous and Trace Emissions System (HATREMS) point source coding forms for all lead point sources, and area source coding forms for all lead sources that are not lead point sources.

(c) *Air quality data.* Each State shall submit to the appropriate Regional Office with the plan, but not as part of the plan, all lead air quality data measured since January 1, 1974, in accordance with the procedures and data forms specified in chapter 3.4.0 of the "AEROS User's Manual" concerning Storage and Retrieval of Aerometric Data (SAROAD).

§ 51.87 Measures.

The lead control strategy must include the following:

(a) A description of each control measure that is incorporated into the lead plan.

(b) Copies of or citations to the enforceable laws and regulations to implement the measures adopted in the lead plan.

(c) A description of the administrative procedures to be used in implementing each selected control measure.

(d) A description of enforcement methods including, but not limited to, procedures for monitoring compliance with each of the selected control measures, procedures for handling violations, and a designation of agency responsibility for enforcement or implementation.

§ 51.88 Data availability.

(a) The State shall retain all detailed data and calculations used in the preparation of lead analyses and plan, make them available for public inspection, and submit them to the Administrator at his request.

(b) The detailed data and calculations used in the preparation of the lead analyses and control strategies is not considered a part of the lead plan.

[FR Doc.77-35556 Filed 12-13-77;8:45 am]