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STATE OF MINNESOTA
MINNESOTA DEPARTMENT OF HEALTH

STATEMENT OF NEED
AND REASONABLENESS

IN THE MATTER OF PROPOSED PERMANENT RULES
OF THE MINNESOTA DEPARTMENT OF HEALTH (MDH)
GOVERNING LEAD ABATEMENT METHODS AND STANDARDS
FOR LEAD IN PAINT, DUST, AND DRINKING WATER,
PARTS 4750.0100 TO 4750.0800

OCTOBER 1990

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The Minnesota Department of Health, pursuant to Minnesota Statutes, section 14.05 to 14.12 and 14.22 to 14.28, presents the facts establishing the need for and reasonableness of the above-captioned proposed permanent rules.

To adopt the proposed rules, the Department must demonstrate it has complied with all the procedures and substantive requirements of rulemaking. Those requirements are that: 1) there is statutory authority to adopt the rule; 2) all necessary procedural steps have been taken; 3) the rules are needed; 4) the rules are reasonable; and 5) any additional requirements imposed by law have been satisfied. This statement demonstrates that the Department has met these requirements.

I. STATUTORY AUTHORITY

The statutory authority of the Department to adopt rules governing abatement of lead in residences is outlined below. Specific statutory authority for each part of the rule is discussed in detail as part of the rule-by-rule justification.

Laws of Minnesota, 1990, Chapter 533, section 7, as codified into Minnesota Statutes, section 144.878, require the commissioner to adopt rules to establish: 1) sampling and analysis methods for residential assessments; 2) standards for lead in paint, dust, and drinking water; 3) abatement methods for lead in paint, dust, and drinking water; and 4) variance procedures to allow for use of innovative abatement methods. The commissioner is in the process of adopting variance procedures by separate rulemaking for the Environmental Health Division of the Minnesota Department of Health.

The commissioner also may adopt reasonable rules pursuant to Minnesota Statutes, sections 144.05 and 144.12, for the preservation of public health.

II. COMPLIANCE WITH RULEMAKING PROCEDURAL REQUIREMENTS

Minnesota Statutes, sections 14.05 - 14.12 and 14.22 - 14.28, specify certain procedures which must be followed when an agency adopts or amends rules. Procedures applicable to all rules (Minnesota Statutes, sections 14.04 - 14.15) have been complied with by the commissioner.

Minnesota Statutes, section 14.10, require an agency that seeks information or opinions from persons outside the agency for adoption of rules to publish notice of such action in the State Register. This serves to notify interested persons in the community of the opportunity to submit comment or data on the subject of the rules. A notice of solicitation of outside information or opinions appeared in the State Register on January 22, 1990, at 14 S.R. 1879 (Volume 14, page 1879). A notice and copy of the Statement of Need and Reasonableness was sent to the Legislative Committee to Review Administrative Rules.

Pursuant to Minnesota Statutes, section 14.23, the commissioner has prepared this statement of need and reasonableness which is available to the public.

III. FISCAL IMPACT

The adoption of these rules will not require expenditure of public money by local public bodies of greater than $100,000 in the two years following promulgation. The proposed rules do not, of themselves, require any public expenditures since Minnesota Statutes, section 144.874, requires boards of health to perform the duties in the proposed rules. Minnesota Statutes, section 144.878, requires the Commissioner of Health to adopt the proposed rules. The costs are imposed by the statutory requirements rather than the proposed rules. The net fiscal impact of the proposed rules is therefore zero.

Minnesota Statutes, section 144.874, requires boards of health to: conduct assessments of residences when a child is identified with a blood lead level that exceeds 25 micrograms per deciliter or when a pregnant woman is identified with a blood lead level of at least 10 micrograms per deciliter; to issue abatement orders if violations of standards for lead in paint, bare soil, dust, or drinking water are found during the assessment; to post warning notices on all entrances to properties for which abatement orders have been issued; and to retest paint, bare soil, dust, or drinking water after the abatement has been completed. Minnesota Statutes, section 144.878, requires the commissioner of health to establish by rule the standards for lead, assessment procedures, and approved abatement methods.

A consolidated fiscal note (for the MDH and Pollution Control Agency) was prepared on March 28, 1990, for Minnesota Statutes, sections 144.871 to 144.878 (introduced as House File No. 1970, titled "Residential Lead Removal Bill" and Senate File No. 1937-1E). The Department of Health's portion of the consolidated legislative fiscal note (Fiscal Note, 1990) estimated costs to local governments to be $177,500 in the first year and $184,600 in the second year. This estimate has not significantly changed.

IV. EFFECT ON AGRICULTURAL LAND

The adoption of these rules will not have any impact on agricultural land (Minnesota Statutes, section 14.11).

V. EFFECT ON SMALL BUSINESS

Minnesota Statutes, section 14.115, requires that an agency consider five factors for reducing the impact of proposed rules on small businesses, these being the following:

1. less stringent compliance or reporting requirements;

2. less stringent schedules or deadlines for compliance or reporting requirements;

3. consolidation or simplification of compliance on reporting requirements;

4. design standards for small businesses; and

5. exemption of small businesses from the proposed rule.

Small business is defined as ".... a business entity, including its affiliates that (a) is independently owned and operated; (b) is not dominant in its field; and (c) employs fewer than 50 full time employees or has gross annual sales of less than 4 million dollars...". The small businesses most affected by the proposed rules are landlords and abatement contractors.

The MDH has considered each of the five factors as follows:

1. Less stringent compliance or reporting requirements. Landlords do not have any reporting requirements in the proposed rules. Abatement contractors are only required to register with the commissioner and this requirement is in Laws of Minnesota, 1990, Chapter 533, section 6, as codified into Minnesota Statutes, section 144.876. Compliance with abatement preparations, abatement methods, and clean-up methods are based on protection of public health and the environment by preventing or minimizing lead exposure. This is required by Laws of Minnesota, 1990, Chapter 533,

section 7, as codified into Minnesota Statutes, section 144.878, subdivision 2. Allowing small businesses to meet less stringent compliance requirements would fail to satisfy the cited statute and is therefore inappropriate.

2. Less stringent schedules or deadlines for compliance or reporting requirements. The only schedules and deadlines in the proposed rules are for daily clean-up of the worksite and for completion of final clean-up within seven days of completion of active abatement. Daily clean-up is necessary to protect public health and the environment, as required by Minnesota Statutes, section 144.878, subdivision 2. This is also true of completion of final clean-up within seven days. Also, if the waste containment and daily clean-up requirements have been met, then the final clean-up deadline should not pose a problem since only vacuuming and washing remain to be done. Allowing small businesses to meet less stringent compliance requirements would fail to satisfy the cited statute and is therefore inappropriate.

3. Consolidation or simplification of compliance on reporting requirements. The only reporting requirement for small businesses in the proposed rule is registration. Registration is required by Minnesota Statutes, section 144.876. The proposed rules allow registration by telephone or letter. The proposed rules cannot be made significantly simpler on this point without exempting small businesses altogether but exemption would not satisfy the statutory requirement.

4. Design standards for small businesses. The proposed rules allow an abatement contractor to choose among several approved abatement methods. These methods are selected to protect public health and the environment as required by Minnesota Statutes, section 144.878, subdivision 2. Establishing design standards for small businesses is therefore inappropriate.

5. Exemption of small businesses from the proposed rule. Compliance with the proposed rules is needed for protection of public health and the environment by preventing or minimizing lead exposure. This is required by Minnesota Statutes, section 144.878, subdivision 2. Exempting small businesses from the proposed rules would fail to satisfy the cited statute and is therefore inappropriate.

VI. NONMANDATORY ACTIONS BY THE COMMISSIONER

In addition to the required mailing of the notice to all parties on the agency mailing list, the department requested outside information or opinions of 26 persons interested in the subject of the proposed rules. These persons were also mailed a copy of the notice and proposed rule. They are listed on the "additional mailing list" which the department entered into the rule record.

VII. NEED FOR THE RULES

"In short, lead is toxic wherever it is found, and it is found everywhere" (ATSDR, 1988, page II-6).

In establishing the need for and reasonableness of the proposed rules, primary emphasis is placed on scientific review documents rather than on the thousands of published individual scientific reports. However, some individual scientific reports will also be cited. Information specific to Minnesota will also be presented as evidence that the problems addressed by the proposed rule exist in Minnesota as well as nationally.

In 1985, the Centers for Disease Control (CDC) issued its current position on childhood lead poisoning and states that:

> Excessive absorption of lead is one of the most prevalent and preventable childhood health problems in the United States today.

In 1986, the United States (U.S.) Environmental Protection Agency (EPA) prepared a four volume document titled "Air Quality Criteria for Lead" (EPA, 1986). Although specifically prepared as a basis for establishing an air quality standard for lead, this document reviewed hundreds of scientific reports dealing with all aspects of lead. EPA concludes that:

> A number of adverse effects in humans and other species are clearly associated with lead exposure and, from an historical perspective, the observed "thresholds" for these various effects (particularly neurological and heme biosynthesis effects) continue to decline as more sophisticated experimental and clinical measures are employed to detect more subtle, but still significant effects. These include significant alterations in normal physiological functions at blood lead levels markedly below the currently accepted 25 ug/dl "maximum safe level" for pediatric exposures (EPA, 1986, p. 13-50).

The American Association of Pediatrics (AAP, 1987, p. 457) states that:

> Lead remains a significant hazard to the health of American children. Virtually all children in the United States are exposed to lead that has been dispersed in air, dust, and soil by the combustion of leaded gasoline. Several hundred thousand children, most of them living in older houses, are at risk of ingesting lead-based paint as well as lead-bearing soil and house dust contaminated by the deterioration of lead-based paint.

The Agency for Toxic Substances and Disease Registry (ATSDR, 1988, p. 1) states that:

> Exposure to lead continues to be a serious public health problem -- particularly for the young child and the fetus. The primary target organ for lead toxicity is the brain or central nervous system, especially during early child development. In children and adults, very severe exposure can cause coma, convulsions, and even death. Less severe exposure of children can produce delayed cognitive development, reduced IQ scores, and impaired hearing -- even at exposure levels once thought to cause no harmful effects. Depending on the amount of lead absorbed, exposure can also cause toxic effects on the kidney, impaired regulation of vitamin D, and diminished synthesis of heme in red blood cells. All of these effects are significant. Furthermore, toxicity can be persistent, and effects on the central nervous system (CNS) may be irreversible.
>
> In recent years, a growing number of investigators have examined the effects of exposure to low levels of lead on young children. The history of research in this field shows a progressive decline in the lowest exposure levels at which adverse health effects can be reliably detected. Thus, despite some progress in reducing the average level of lead exposure in this country, it is increasingly apparent that the scope of the childhood lead poisoning problem has been, and continues to be, much greater than was previously realized.

The blood lead level at which effects are recognized to occur has been revised to progressively lower concentrations, from a range of 60 to 80 micrograms of lead per deciliter of whole blood in 1959, to 40 in 1970, to 30 in 1978, (Lin-Fu, 1982, pp. 4 - 6.) and to 25 in 1985 (CDC, 1985, pp. 1 and 2). Blood lead levels of ten to fifteen micrograms per deciliter have been associated with subtle but measurable effects (ATSDR, 1988, page IV-21).

In Minnesota, from 1986 through 1989, 123 to 178 children per year were diagnosed (Godes, 1987, 1988, 1989, 1990; MDH, 1990) as having lead toxicity as defined in 1985 by the Centers for Disease Control

["**Lead toxicity** is an elevated blood lead level with an erythrocyte protoporphyrin (EP) level in whole blood of 35 ug/dl or greater." (CDC, 1985, p. 2)].

The number of children diagnosed with lead toxicity is less than the actual number of Minnesota children who have lead toxicity because screening programs do not achieve 100 percent participation by the target age group. The number of Minnesota children who had elevated blood lead as defined by CDC was about three times the number with lead toxicity (MDH, 1987).

[**Elevated blood lead level**, which reflects excessive absorption of lead, is a confirmed concentration of lead in whole blood of 25 ug/dl or greater." (CDC, 1985, p. 1)].

Table 1 briefly lists effects and associated blood lead levels found by researchers. In light of these effects, CDC is reviewing its definitions of lead toxicity and elevated blood lead in light of research that suggests that adverse health effects occur at lower lead levels than previously believed. A new level of toxicity at 10 to 15 micrograms per deciliter will likely be adopted, although the timing of this change is uncertain. Lowering the blood lead level of concern to 10 to 15 micrograms per deciliter will greatly increase the cost of testing and response.

Since the exact blood lead level at which CDC will recommend response is unknown and since lowering this level entails serious cost problems, the MDH proposes to use the existing CDC criterion of 25 micrograms per deciliter until CDC completes its review.

The increased costs that will result from lowering the definition of lead toxicity are due to more costly screening tests being needed and more children needing response. The most common screening test for lead toxicity is the erythrocyte protoporphyrin (EP) test because it costs less and is easier to perform than a blood lead test. However, the EP test is not useful for indicating blood lead levels below 25 micrograms per deciliter.

A much larger number of children will be included in response efforts. Of children screened by MDH in 1986 and 1987, 14.6% equaled or exceeded 15 micrograms per deciliter (MDH, 1987). This percentage is comparable to the national percentage of 17% (ATSDR, 1988, page I-47). Extrapolated to the general population, the 14.6% figure could mean that about 65,700 Minnesota children aged nine months to six years would equal or exceed 15 micrograms per deciliter. (Extrapolations from a sample of 1,410 children actually tested by MDH in 1986 and 1987 to the 450,000 Minnesota children in the same age group is not without statistical problems but this is the best available information. ATSDR presents a similar extrapolation from children actually tested to the national population of children.)

Although lead toxicity is most commonly found in poor, inner-city minority children, adverse health effects due to lead are increasingly recognized in all segments of the population. In reviewing the scientific literature on lead toxicity, ATSDR (ATSDR, 1988, page II-4) stated that "It came to be recognized as a disease that could affect middle- and upper-class children, children living in rural and suburban areas, and those in low-income, inner-city families."

TABLE 1:
LOWEST OBSERVABLE EFFECT LEVEL (BLOOD LEAD)
FOR EFFECTS IN CHILDREN

(ATSDR, 1988, IV-21)

Lowest Effect Blood Lead (micrograms per deciliter)	Neurological Effects	Heme Synthesis Effects	Other Effects
10 - 15	Deficits in neuro-behavioral development (Bayley and McCarthy Scales); electrophysiological changes	ALA-D inhibition	Reduced gestational age and weight at birth; reduced size up to age 7-8 years
15-20		EP elevation	Impaired vitamin D metabolism; Py-5-N inhibition
<25	Lower IQ, slower reaction time (cross-sectional studies)		
30	Slowed nerve conduction velocity		
40		Reduced hemoglobin; elevated CP and ALA-U	
70	Peripheral neuropathies	Frank anemia	
80-100	Encephalopathy		Colic, other gastrointestinal effects; kidney effects

ALA-D means "aminolevulinic acid dehydrase" (an enzyme)
ALA-U means "aminolevulinic acid in urine"
(a toxin normally metabolized by ALA-D)
CP means "coproporphyrin" (a precursor of heme)
EP means "erythrocyte protoporphyrin" (a precursor of heme)
IQ means "intelligence quotient"
Py-5-N means "pyrimidine-5'-nucleotidase" (an enzyme)

(Abbreviations from EPA, 1986, pp. xii - xv.)

VIII. REASONABLENESS OF THE RULE

ATSDR (ATSDR, 1988, II-1) cites an estimate by Patterson in 1965 that pre-industrial humans probably had an average blood lead level of 0.5 micrograms of lead per deciliter of whole blood. The dispersive uses of lead have made attainment of blood lead levels of 0.5 micrograms per deciliter impractical, if not impossible, with existing technology. Attainment of blood lead levels below 25 micrograms per deciliter (ug/dl) is possible by abating lead sources that have been unsuccessfully or incompletely addressed.

The ATSDR Executive Summary (ATSDR, 1988, page 8) lists the following "key findings":

- As persisting sources for childhood lead exposure in the United States, lead in paint and lead in dust and soil will continue as major problems into the foreseeable future.
- As a significant exposure source, leaded paint is of particular concern since it continues to be the source associated with the severest forms of lead poisoning.
- Lead levels in dust and soil result from past and present inputs from paint and air lead fall out and can contribute to significant elevations in children's body lead burden (i.e., the accumulation of lead in body tissues).
- In large measure, paint and dust/soil lead problems for children are problems of poor housing and poor neighborhoods.
- Lead in drinking water is a significant source of lead exposure in terms of its pervasiveness and relative toxicity risk. Paint and dust and soil lead are probably more intense sources of exposure.
- Greater attention must be paid to lead exposure sources away from the home, especially lead in paint, soil, and drinking water in and around schools, kindergartens, and similar locations.
- The phasing down of lead in gasoline has markedly reduced the number of children impacted by this source as well as the rate at which lead from the atmosphere is deposited in dust and soil.
- Lead in food has been reduced to a significant degree in recent years and contributes less to body burdens in the United States than in the past.
- Significant exposure of unknown numbers of children can also occur under special circumstances: renovation of old houses with lead-painted surfaces, secondary exposure to lead transported home from work places, lead-glazed pottery, certain folk medicines, and a variety of others (sic) unusual sources.

ATSDR (ATSDR, 1988, page 12) continues:

> ... Of particular interest is water as it comes from the tap not only in homes but in public facilities such as kindergartens and elementary schools. ...
>
> Existing leaded paint in U.S. housing and public buildings remains an untouched and enormously serious problem despite some regulatory action in the 1970's to limit further input of new leaded paint to the environment. For this source, corrective actions have been a clear failure.
>
> Lead in soil and dust also remains a potentially serious exposure source, and remediation attempts have been unsuccessful.

Lead-based paint, lead-contaminated dust, and lead-contaminated drinking water have been identified in Minnesota (ATSDR, 1988; Indian Health Board, 1989; Hennepin County, 1987, 1988, 1989, 1990; MDH, 1984, 1988a). Paint, dust, and drinking water are the lead sources addressed in the proposed rules.

Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.878, subdivision 2, paragraph (a), require the Commissioner of Health to adopt standards for lead in paint, dust, and drinking water. Since lead serves no useful biological purpose in people but is toxic to people, the ideal lead exposure to people is zero. As illustrated above, the lead exposure to people has been and remains much more than zero. Achieving zero lead exposure (removing all lead from the human environment) is not technologically possible, much less economically feasible, so "acceptable" levels of lead exposure must be set. Setting acceptable lead levels when zero is the ideal, but unattainable, level is an exercise in public policy that is open to debate. Interested parties may differ on what is acceptable.

The proposed standards for lead in paint, dust, and drinking water are based on a combined consideration of scientific studies, public health protection, regulatory precedent, and practicality. Scientific studies are a necessary but inconclusive basis for setting standards for lead in paint, dust, and drinking water (see discussion in section IX under part 4750.0300).

The proposed rules are intended to address the situation in Minnesota and therefore are similar to, but not necessarily identical to, rules adopted elsewhere. For example, unlike Minnesota, older urban areas in the East have few single family detached homes with yards in the inner city. Accordingly, some of the soil assessment requirements in the proposed rules do not exist in rules in the East. The proposed standards for paint and drinking water are within the range of standards adopted elsewhere. The

proposed standards for dust are slightly more stringent than those adopted elsewhere. Tables 5 and 6 list standards that have been adopted in other jurisdictions.

IX. RULE-BY-RULE JUSTIFICATION

PART 4750.0100 APPLICABILITY.

The applicability of Parts 4750.0100 to 4750.0800 is not limited to a substate area by Laws of Minnesota, 1990, Chapter 533, section 7, as codified into Minnesota Statutes, section 144.878, subdivisions 1, 2, or 4, which require the adoption of rules governing lead abatement methods and standards for lead in paint, dust, and drinking water. The existing Emergency Rule on this subject was limited by Minnesota Statutes, section 144.856, to cities of the first class. (Section 144.856 was repealed by Laws of Minnesota, 1990, Chapter 533, section 8.) This part is needed so the public knows to whom the rules apply. The existing Emergency Rule on this subject was limited by Minnesota Statutes, section 144.856, to cities of the first class.

The applicability of these rules to anyone performing or ordering performance of abatement on residential sources of lead exposure to people or the environment does not extend authority to conduct assessments or to order abatements to any person or agency other than a board of health, nor does this applicability limit authority to inspect residences for compliance with health or housing codes.

Parts 4750.0100 to 4750.0800 must be read with Laws of Minnesota, 1990, Chapter 533, as codified into Minnesota Statutes, sections 144.871 to 144.878, and with Minnesota Rules, Chapters 7035 and 7045, and with rules adopted by the Pollution Control Agency pursuant to Minnesota Statutes, section 144.878, subdivision 2, paragraphs (b) and (c), and subdivision 3.

PART 4750.0200 DEFINITIONS.

The terms defined are terms that may have more than one meaning, terms not commonly used, or terms which need exact definition to be consistent with statute.

Subpart 1. Stating that the terms defined in this part are for the purposes of parts 4750.0100 to 4750.0800 is needed to clarify the scope of these terms.

Subpart 2. "Abatement" has the meaning specified in Laws of Minnesota, 1990, Chapter 533, as codified into Minnesota Statutes, section 144.871, subdivision 2. "Abatement" is a term used to define a specific process for the removal, encapsulation, or reduction of lead. Because the term is used in the proposed rules, definition of the term to be consistent with the process defined

in statute is needed. This subpart differs from the corresponding subpart in the emergency rules on this subject due to a change in the statute to simplify language in the 1990 Legislative session. It is reasonable to refer to the statute rather than repeat it.

Subpart 3. "Abatement contractor" is defined in Minnesota Statutes, section 144.871, subdivision 3. It is included in the proposed rule because it is needed to describe who is subject to certain provisions of the proposed rules. This subpart differs from the corresponding subpart in the emergency rules to refer to the statute rather than repeat statute. Reference to the statute ensures consistency with the statutorily defined term.

Subpart 4. "Abrasive blasting" is a phrase used in the proposed rules that is needed to describe a method of removing surface coatings which may contain lead. The definition is reasonable because it conforms to dictionary definitions of "abrasive" as "harsh, rough" and of "blasting" as "a forcible stream of air". (The American Heritage College Dictionary, Second Edition, 1985, Houghton Mifflin Co., Boston.) Minnesota Statutes, section 144.878, subdivision 2, item (c), requires the commissioner of the Pollution Control Agency to adopt rules governing abrasive blasting methods for exterior use. Since this method could also be employed on interior surfaces, abrasive blasting needs to be addressed in these proposed rules. The MDH intends to be consistent with the definition of "abrasive blasting" that the Pollution Control Agency uses in its rules. This subpart differs from the corresponding subpart in the emergency rules due to comments from the Pollution Control Agency to clarify the meaning as stated above.

Subpart 5. "Assessment" is a term used in Minnesota Statutes, section 144.874, subdivisions 1 and 2, but is not defined. Definition of this term is needed to ensure consistent application of the rule. The definition in the proposed rule is reasonable because it is consistent with the context of the above-cited statute and with existing public health practice. This subpart differs from the corresponding subpart in the emergency rules to clarify that assessment is a pre-abatement activity.

Subpart 6. A definition of "bare soil" is needed because:

Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.871, specifically includes bare soil as one of the lead sources to be abated;

Laws of Minnesota, 1990, Chapter 533, section 5, as codified into Minnesota Statutes, section 144.874, requires boards of health to conduct assessments of lead sources; and

Laws of Minnesota, 1990, Chapter 533, section 5, as codified into Minnesota Statutes, section 144.874, requires the commissioner of health to adopt rules for residential assessments.

However, the above statutory requirements do not define "bare soil". The proposed definition is reasonable because it allows on-site determination of an area below which concern is not warranted.

Subpart 7. "Board of health" is needed because Laws of Minnesota, 1990, Chapter 533, section 7, as codified into Minnesota Statutes, section 144.874, imposes certain requirements on a board of health. The definition used in the proposed rules is identical to that in the above-cited statute. This subpart is the same as the corresponding subpart in the emergency rules.

Subpart 8. "Deteriorated paint or deteriorating paint" is a term that is needed to distinguish between intact and deteriorating paint. Laws of Minnesota, 1990, Chapter 533, section 7, as codified into Minnesota Statutes, section 144.878, subdivision 2, requires that intact paint be distinguished from deteriorating paint. Some methods that are appropriate for abatement of intact paint are not appropriate for abatement of deteriorated or deteriorating paint. The definition in the proposed rules is reasonable because it allows practical, on-site determination of the condition of paint. This subpart has no corresponding subpart in the emergency rules and is added as a clarification.

Subpart 9. "Elevated blood lead level" is a term defined in Laws of Minnesota, 1990, Chapter 533, as codified into Minnesota Statutes, section 144.871, subdivision 6, as "at least 25 micrograms of lead per deciliter of whole blood unless the commissioner finds that a lower concentration is necessary to protect public health". (Emphasis added.) The definition in the proposed rules is needed to clarify that the commissioner has not yet found that a lower concentration is necessary to protect public health. The commissioner is aware that the Centers for Disease Control (CDC) is reviewing its definition of "elevated blood lead level" which the Department has traditionally followed (See previous discussion in VII Need for the Rules). The definition in the proposed rule is reasonable because it uses the blood lead level of 25 micrograms per deciliter specified in the above-cited statute and in CDC's current guidelines. This subpart has no corresponding subpart in the emergency rules and is added as a clarification.

Subpart 10. "Encapsulation" is a term that is used in Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.871, subd. 7, to describe an allowed method of abatement. The proposed rules refer to the above-cited statute. This subpart differs from the corresponding subpart in the emergency rules because the statute was changed to simplify this definition in the 1990 Legislative session.

Subpart 11. "High efficiency particulate air filter" is a term that describes commercially-available equipment that is one of the

methods specified for performing abatement and for final cleanup after abatement is complete. This equipment is capable of collecting fine dust particles (HUD, 1990, page 112). The definition is reasonable because the specifications of 99.97% efficiency and 0.3 micron diameter particles describes the collection efficiency and particle size that are commercially available (HUD, 1990, page 112). This subpart has been changed from the corresponding subpart in the emergency rules to conform with existing definitions in state and federal law (Minnesota Rules, Part 4620.3100, subpart 24; and 40 CFR 1926.58(6)).

Subpart 12. "Intact paint" is a term that is needed to distinguish between intact and deteriorating paint. Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.878, subdivision 2, require that intact paint be distinguished from deteriorating paint. Some methods that are appropriate for abatement of intact paint are not appropriate for abatement of deteriorating paint. The definition of "intact paint" as being any paint that is not deteriorating or deteriorated paint as defined in subpart 7 is reasonable because it allows practical, on-site determination of the condition of paint and because the two terms together address all paint conditions. This subpart differs from the corresponding subpart in the emergency rules in referring to the definition in subpart 7 of "deteriorated paint" or "deteriorating paint"

Subpart 13. "Modified-wet abrasive blasting" is a term that needs to be defined because it is a method of removing surface coatings that may contain lead. Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.878, subdivision 2, item (c), require the commissioner of the Pollution Control Agency to adopt rules governing abrasive blasting methods for exterior use. Modified-wet abrasive blasting is a type of abrasive blasting because it uses grit and pressurized air to remove surface coatings. Since this method could also be employed on interior surfaces, modified-wet abrasive blasting needs to be addressed in these proposed rules. The definition is reasonable because it concisely describes the actual method. This subpart differs from the corresponding subpart in the emergency rules due to comments from the Pollution Control Agency that the rules should specify that an amount of water must be used to suppress dust but must avoid causing adherence of wet abrasive to the structure because this would result in cleanup problems.

Subpart 14. "Reassessment" is defined as post-abatement sampling and analysis which is required by Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.874, subdivision 6. The definition in the proposed rule is reasonable because it refers to the sampling and analysis protocols in part 4750.0400 of the proposed rule which are justified below. This term replaces the term "retesting" in the emergency rules for consistency with the term "assessment" in subpart 5.

Subpart 15. "Residence" is a term used in Minnesota Statutes, section 144.874, subdivision 1, and section 144.871, subdivision 8, but "residence" is not clearly defined in this statute. Definition of "residence" is needed to describe where certain provisions apply. Minnesota Statutes, section 144.874, subdivision 1, requires a board of health to conduct an assessment of lead sources in residences of children having elevated blood lead levels and of pregnant women with blood lead levels of at least 10 micrograms per deciliter. The definition of "residence" includes the dwelling unit and associated grounds and any additional structure (such as a garage or storage shed) on the grounds. This is reasonable because lead contamination of any part of the property can cause lead exposure to the residents. Targeting the unit within a multifamily structure in which the affected person resides, rather than assessing all units, is consistent with Minnesota Statutes, section 144.874, and is a reasonable consideration of the cost to do assessments and abatements. This subpart differs from the subpart in the emergency rules only in that a clarification has been added to specify that both exterior structural and ground surfaces are included in the definition.

Subpart 16. "Substrate" is a term that needs to be defined because it describes a building material as distinct from the paint or other coating that may be covering the material. The definition in this subpart is consistent with its use as a term of art. A substrate, according to the second edition of the Houghton-Mifflin American Heritage Dictionary, is also a "substratum" which is defined as "the material upon which another material is coated or fabricated."

Subpart 17. "Vacuum blasting" is a term that needs to be defined because it is a method of removing surface coatings that may contain lead. The definition is reasonable because it concisely describes the actual method. Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.878, subdivision 2, item (c), requires the commissioner of the Pollution Control Agency to adopt rules governing abrasive blasting methods for exterior use. Vacuum blasting is a type of abrasive blasting because it uses grit and pressurized air to remove surface coatings. Since this method could also be employed on interior surfaces, vacuum blasting needs to be addressed in these proposed rules. The MDH intends to be consistent with the definition of "vacuum blasting" that the Pollution Control Agency uses in its rules. This subpart differs from the corresponding subpart in the emergency rules in specifying that the blasting nozzle be surrounded by a chamber under negative air pressure.

Subpart 18. "Waterblasting" is a term that needs to be defined because it is a method of removing surface coatings that may contain lead. Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.878, subdivision 2,

item (c), does not require the commissioner of the Pollution Control Agency to adopt rules governing exterior use of waterblasting because waterblasting employs water and not grit to remove surface coatings. Therefore, waterblasting is not a type of abrasive blasting. The definition of "waterblasting" is reasonable because it concisely describes the actual method. This subpart is the same as the corresponding emergency rules subpart.

Subpart 19. "Window well" is a term that needs to be defined because it has two meanings in common use but only one is intended to be addressed by the proposed rule. In common use, a window well is either the ground area adjacent to a basement window that is usually below grade or the part of a habitation-level window into which the sash fits when the window is closed. The latter window well is intended to be addressed and "window well" is reasonably defined as such. This subpart has no corresponding subpart in the emergency rules and is added as a clarification.

Subpart 20. "Window sill" needs to be defined because it must be distinguished from "window well" for the purposes of this rule. The definition in the proposed rule is from the second edition of the Houghton-Mifflin American Heritage Dictionary, with the addition of "interior". This subpart has no corresponding subpart in the emergency rules and is added because the proposed permanent rule sets different standards for lead in dust on floors, window wells, and window sills. The emergency rule set one standard for lead in dust for all surfaces which does not recognize significant differences between surfaces.

Subpart 21. "X-ray fluorescence analyzer" is needed to describe a commercially-available instrument (i.e., PGT, Inc. and Warrington Labs manufacture this instrument) that is commonly used by other regulatory bodies in the U.S. (see table 6) to measure on-site paint, whether intact or deteriorating, and that is also commonly used as a basis for regulation. The lead standards in table 6 that are expressed in milligrams per square centimeter are usually measured by a X-ray fluorescence analyzer. This subpart differs from the corresponding emergency rule subpart in response to a comment from David Jacobs of the Georgia Tech Research Institute that "X-ray fluorescence analyzer" is technically more correct than "X-ray fluorometer".

PART 4750.0300 STANDARDS.

Laws of Minnesota, 1990, Chapter 533, section 2, as codified into Minnesota Statutes, section 144.878, subdivision 2, paragraph (a), requires the Commissioner of Health to adopt standards for lead in paint, dust, and drinking water. Since lead serves no useful biological purpose in people, the ideal lead exposure to people is zero. Zero lead exposure is not technologically possible, much less economically feasible, so "acceptable" levels of lead exposure must be established. Since scientific studies do not identify maximum

allowable lead exposure levels (see discussion below), the proposed standards for lead in paint, dust, and drinking water are based on a combined consideration of scientific studies, public health protection, regulatory precedent, and practicality.

Many scientific studies of lead exposure have been conducted but, as Elwood concludes (Elwood, 1986, p. 18):

> The degree to which current methods of measurement of lead in the sources truly represent the actual exposure of subjects is unknown.

Simply put, the available scientific data do not allow for use of a mathematical formula that can definitively account for all of the potential contributing sources, risk factors, and biological intake and uptake variables to generate a regulatory standard for lead.

Regulatory practice for environmental toxins has usually been to assume that one source of exposure causes one set of dose-response related health effects. This assumption simplifies regulation but is unscientific and is especially so for lead. The complexities of science are discussed by Silbergeld (Silbergeld, 1989, p. 138):

> In reality, neither exposures (sources) and risks (outcomes) are simple, nor are they very often correlated in simple relationships. For toxins like lead, which persist essentially forever in the environment, the dissection of source-specific contributions is almost impossible, except for instances where isotopic identification of lead at the source, in the environment, and in exposed persons is possible (e.g., the Turin lead study). For lead, it has been well-established that each vector or route of exposure - air, water, soils and dusts, or food - is the sum of contributions from multiple sources as well as recycling from one medium to another. In certain situations, one route of exposure may predominate (for instance, lead-based paint in delapidated (sic) housing), but in most cases, exposure of individuals and groups incorporates many specific sources and multiple routes through the environment.

Silbergeld continues:

> More critically, the univariate model causes problems because of the assumption of simple endpoints. Lead exposure at high doses can cause disease, even in the absence of other contributing factors. At high doses, lead can cause encephalopathy (brain damage) and kidney failure. However, at lower doses, the types of health effects induced by lead are more subtle: deficits in cognition, learning, and other parameters of neurological function; increased hypertensive heart disease; decreased

> length of gestation and lowered rate of growth in stature in infants. These are by their natures all multifactorial, complex biological events. The degree of impairment of these complex systems - the nervous system, cardiovascular system, and neuroendocrine function related to pregnancy and growth - depends upon many environmental factors, including diet, interacting with a genetic repertoire expressed in the individual.

Tables 2 and 3 list potential lead sources and risk factors that can interact in the manner discussed by Silbergeld above.

TABLE 2: POTENTIAL CONTRIBUTING SOURCES OF LEAD EXPOSURE

Existing paint with lead-based pigments or drying agents

Soil and dust contaminated by leaded gasoline combustion and/or exterior leaded paint

Leaded folk medicines

Leaded folk cosmetics

Lead-soldered food cans

Antiknock additives in gasoline

Lead acid batteries

Leaded solder on copper water pipes

Industrial air pollution

Processed food

Lead glaze on some ceramic and pottery

Leaded pigments in ink

TABLE 3: RISK FACTORS ASSOCIATED WITH LEAD EXPOSURE

AGE - between 9 months and 6 years due to physiology and behavior

RACE OR ETHNICITY - minorities have higher blood lead levels in surveys

LOW INCOME - due to poor housing, diet, health care, education

POOR NUTRITION - iron and calcium deficiencies increase lead absorption

LESS PARENTAL SUPERVISION - children eat more nonfood items

LESS PARENTAL EDUCATION - lack of awareness of lead

URBAN RESIDENCE - higher concentrations of potential lead sources

Regarding mental development specifically, McMichael (McMichael, 1989, p. 154) echoes Silbergeld in stating that:

> The quantitative risk assessment of the effects of environmental lead exposure upon early childhood mental development can be neither precise nor conclusive at this stage. As is evident from the epidemiological research to date, this uncertainty derives from statistical difficulties in estimating small effects at low exposures, and from methodological difficulties in the measurement of multiple-source environmental exposure and of complex developmental outcomes.

Another difficulty is that scientists rarely recommend lead standards in published scientific articles. This is not to suggest that science is useless (the EPA and ATSDR review documents are very helpful) but that it is a necessary but insufficient basis for setting standards for lead in paint, dust, and drinking water.

In estimating the numbers of children exposed to various lead sources, ATSDR used lead levels of 0.7 milligrams per square centimeter of paint, 310 parts per million for dust, and 20 micrograms per liter for drinking water (ATSDR, 1988, pp. VI-13, VI-30, and VI-40). ATSDR uses these concentrations not as standards but for the purpose of estimating the number of children exposed to these lead sources. The ATSDR concentrations compare to proposed standards of 1.0 milligrams per square centimeter of paint, 300 parts per million for dust in carpeting, and 50 micrograms per liter for drinking water. HUD uses 1.0 milligrams per square centimeter of paint for HUD-assisted housing (HUD, 1990). Tables 5 and 6 list standards in effect in other jurisdictions.

The EPA estimates in Table 4 show average lead exposures and the blood lead levels in two-year old children associated with three scenarios (adapted from EPA, 1986, p. VIII-9). Note that these are <u>averages</u>, not worst case estimates. Intake is the amount of lead taken into the lung or gut while uptake is the amount of lead actually absorbed into the bloodstream. A point source is an industrial lead facility. Note also that the upper estimates of the ranges of uptake are about double the lower estimates.

The available scientific data do not allow for use of a mathematical formula that can definitively account for all of the potential contributing sources, risk factors, and biological intake and uptake variables to generate a regulatory standard for lead.

TABLE 4: AVERAGE LEAD INTAKE AND UPTAKE IN 2-YEAR-OLD CHILDREN

Parameter	Urban Nonpoint Source Area	Point Source Impacted Area	Urban Area With Lead Paint
Air			
Outdoor air lead (ug/m^3)	0.25	1.0	0.25
Indoor air lead (ug/m^3)	0.08-0.2	0.3	0.08-0.2
Lead uptake from lungs (ug/day)	25-45	42	25-45
Food and Water			
Dietary lead consumption (ug/day)			
a) from solder or other metals	6.1	6.1	6.1
b) atmospheric lead	4.5	4.5	4.5
c) natural lead, indirect atmospheric lead	4.4	4.4	4.4
Dietary uptake (ug/day)	4.5-6.0	4.5-6.0	4.5-6.0
Soil and Dust			
Outdoor surface soil/dust lead (ug/g)	55-200	400-975	55-200
Indoor dust lead (ug/g)	85-225	785-1350	2000
Lead uptake from soil/dust	2.7-11.3	12.3-31.9	22.9-44.2
Total lead uptake from lung and gut (ug/day)	7.3-17.8	17.4-38.7	27.6-50.7
Average blood lead (ug/dl)	3-7	6-15	11-20

Protection of public health requires that each potential source of lead exposure be considered in context. Regarding the current CDC blood lead guideline of 25 micrograms per deciliter, ATSDR (ATSDR, 1988, p. I-23) states:

> If Source A contributes an equivalent of 20 ug/dl or 80% of this burden, and source B contributes 5 ug/dl or 20%, then one can remove the major source of the lead, 80% and have left 20% or 5 ug/dl. If this major source is not abatable, but abatement of the minor source is possible, then the latter action is still useful.

Some lead sources are technically more difficult to properly abate than other sources and abatement itself can worsen the health hazard. Also, some lead sources are more readily absorbed into the body due to physical or chemical characteristics and are thus more of a health hazard. These factors were considered in proposing the lead standards in the proposed permanent rules.

The proposed standard for lead in paint is 0.5% (5,000 parts per million) by weight or 1.0 milligrams per square centimeter as measured by X-ray fluorescence analyzer. (A weight standard and an

area standard are not convertible into each others units and cannot be directly compared.) The 0.5% lead standard for paint appears to be inconsistent with the proposed standard for lead in dust in carpeting of 300 parts per million. However, experience has shown that abatement of lead-based paint has often increased the health hazard. This occurred because large quantities of previously inaccessible lead were made accessible by methods that released paint lead as fine particles that are easily ingested (Baltimore, 1987, p. 2). By contrast, dust already consists of fine particles that are easily ingested and abatement does not worsen the health hazard. To protect public health, the standard for lead in dust in carpeting can and should be more stringent than the standard for lead in paint.

The proposed standards for lead in dust on hard surfaces are in an area-based measurement, which is discussed later, and this does not convert or compare with the weight-based measurements being discussed here.

Just as the proposed standard for lead in paint appears to be inconsistent with the proposed standard for dust, both of these appear to be inconsistent with the proposed standard for lead in drinking water, which is 50 micrograms per liter. This volume concentration converts to about 50 parts per billion (not million) by weight. However, lead in drinking water is dissolved and is even more readily absorbed into the body than fine particles. Therefore, to protect public health, the standard for lead in drinking water can be more stringent than for lead in either paint or dust. The hazard from lead in water is greater because drinking water is a necessity.

Regulatory precedent for standards for lead in paint, dust, and drinking water exists in federal laws and the laws of other states and cities (see tables 5 and 6). Unlike scientists, regulatory agencies must set standards. Regulatory precedent, or existing standards, is a valid consideration in proposing standards because it represents previous study and judgment by responsible authorities in other jurisdictions. If these efforts are not outdated, there is often little to gain by duplicating them except to consider local or regional circumstances that are relevant.

TABLE 5: LEAD STANDARDS FOR DUST AND DRINKING WATER

Dust - Maryland and Massachusetts:
200 micrograms of lead per square foot of floor area;
500 micrograms of lead per square foot of window sill area;
800 micrograms of lead per square foot of window well area.

Water - U.S. Environmental Protection Agency
50 micrograms of lead per liter of water (under review)

TABLE 6: LEAD PAINT STANDARDS

Jurisdiction (by statute, rule, or ordinance)	Existing Paint Range 0.06% - 0.5% or 0.7-1.2 milligrams (mg) per square centimeter (sq cm)	New Paint 0.06%, if any
Arizona[1]	0.5%	
Arkansas[1]	0.5%	
Baltimore, MD[2]	0.5% or 0.7 mg/sq cm	0.06%
Connecticut[3]	0.06% or 0.7 mg/sq cm	
Delaware[1]	0.5%	
Detroit, MI[2]	0.5% or 1.0 mg/sq cm	
District of Columbia[2]	0.06%	
Illinois[2]	0.5% or 1.0 mg/sq cm	
Jefferson County, KY[3]	0.06% or 0.7 mg/sq cm	
Kentucky[1]	0.06%	
Los Angeles County, CA[3]	0.7 mg/sq cm	0.06%
Louisiana[2]	0.5% or 0.7 mg/sq cm	0.06%
Louisville, KY[3]	0.06% or 0.7 mg/sq cm	
Maine[1]	0.5%	
Maryland[2]	0.5% or 0.7 mg/sq cm	
Massachusetts[2]	0.5% or 1.2 mg/sq cm	0.06%
Minneapolis, MN[2]	0.5% or 1.2 mg/sq cm	
New Jersey[2]	1.0% or 2.0 mg/sq cm	
Philadelphia, PA[2]	0.06% or 0.7 mg/sq cm	
Rhode Island[2]	0.5% or 0.7 mg/sq cm	
Saint Paul, MN[2]	0.5% or 1.0 mg/sq cm	
South Carolina[1]	0.06% or 0.7 mg/sq cm	
Wisconsin[2]	0.06% or 1.0 mg/sq cm	

[1]GTRI, 1990, p. A-1.0. [2]Bibliography [3]MDH, 1988b, p. 20.

The proposed standards for lead in paint and drinking water are the same as those in most other jurisdictions that have standards for lead in paint and drinking water. The range of existing standards for lead in paint is 0.06 percent to 0.5 percent or 0.7 - 1.2 milligram per centimeter as measured by X-ray fluorescence analyzer. The 0.5% standard dates to the 1973 Consumer Product Safety Commission regulations for manufacture of paint while the 0.06% standard dates to the 1978 regulations which are still in effect (CPSC, 1977).

Regulatory precedent was not followed in proposing standards for lead in dust on hard surfaces because lead data collected by the Minneapolis Public Housing Authority after lead abatements followed by two cleanings show that more stringent standards can be met in practice (MPHA, 1990). The proposed standards for dust on hard surfaces are 80 micrograms per square foot on a floor, 300 micrograms per square foot on a window sill, and 500 micrograms per square foot on a window well. The existing standards in Maryland and Massachusetts are 200/500/800 micrograms per square foot on a floor/window sill/window well, respectively.

Windows are attractive to small children who explore their world by putting everything into their mouths. The lead paint chips and dust present on windows should therefore be kept as low as practical. Based on both the Minneapolis data and the standards in Maryland and Massachusetts, floors are easier to clean than window sills or wells and a more stringent standard can be met on floors. Since small children crawl or play on floors, floors should also be kept as low as practical.

Subpart 1. Paint. The proposed standards for lead in existing paint are within the range of standards commonly used by other regulatory authorities (see table 6). Although new paint is limited by the Consumer Product Safety Commission (CPSC, 1977). to six one-hundredths of one per cent (0.06%) by dry weight, existing technology may not be sufficient to remove existing paint from any substrate to a level of 0.06% (HUD, 1990, page 2). A concentration of 0.5% lead by dry weight in existing paint is commonly used as a standard in other jurisdictions (see table 6). A weight percent standard is reasonable for lead in paint because the methods for sampling and analyzing weight percent are well known and routinely used (HUD Memorandum, 1990). This subpart differs from the corresponding emergency rule subpart in that the date of application of the paint is deleted as being impractical to determine. Also deleted was the emergency rules standard dealing with new paint and for the same reason. Part 4750.0500 Lead Abatement Methods, subpart 3, requires that paint used to repaint a substrate after abatement must not have a lead concentration of 6/100 of one percent (600 parts per million) or more by dry weight.

Subpart 2. Dust. The standard for lead in dust on a hard surface in the proposed rule is 80 micrograms of lead or more per square

foot for a floor, 300 micrograms of lead or more per square foot for a window sill, and 500 micrograms of lead or more per square foot for a window well. The standard for lead in dust on carpeting in the proposed rule is 300 parts per million by weight. Existing standards in other state and local jurisdictions use standards of 200/500/800 micrograms per square foot for floors/window sills/window wells, respectively. The Department is not aware of any standards for lead in dust on carpeting.

Vigorous cleaning is necessary for hard surfaces due to dust generated by industrial society or to lead-paint abatement because this dust contains lead in small particles that are easily ingested. A standard for lead dust in carpeting is also necessary because carpeting can act as a reservoir for lead dust and thereby cause lead exposure after a residence has been abated of other sources. The proposed dust lead standard for carpeting is the same as the standard proposed for soil lead by the Pollution Control Agency. This is reasonable because the levels of lead in soil and in interior housedust in carpeting have been found to correlate (Roberts, 1990). The analytical methods for dust lead in carpeting and for soil lead are the same.

This subpart differs from the corresponding emergency rule in response to comments that a weight-per-area measure is more appropriate for hard surfaces than a weight-per-weight measure for dust. This subpart is also different from the emergency rules in proposing a standard for lead in dust in carpeting.

Obtaining enough dust from a hard surface to allow a reliable measurement of the weight of lead in the total weight of sample (weight-per-weight measurement) is often difficult and should be impossible after final cleanup. It is therefore necessary to measure dust lead by the weight of lead per area of collection surface (weight-per-area). Measurements by weight-per-weight are not convertible into measurements by weight-per-area.

In addition to the above practical reason for using a weight-per-area measurement for dust, a weight-per-area measurement is theoretically a better measure of the hazard presented by lead dust. This is so because the weight-per-weight measurement reflects the general cleanliness of the residence (i.e., how much nonlead dust and dirt dilutes the lead dust) as much as it reflects the lead present. A weight-per-area measurement (also called a "loading" measurement) is independent of the nonlead dust and is therefore a more direct measure of the lead present (Milar and Mushak, 1982, page 146 - 147).

However, these arguments for dust from a hard surface do not apply to dust from carpeting. Unlike a hard surface, carpeting holds much more dust and sufficient quantity can be obtained to allow measurement on a weight-per-weight basis. Furthermore, the carpeting holds much larger particles than does a hard surface and

these larger particles are more analogous to soil than to dust that collects on a hard surface. Accordingly, it is reasonable to sample and analyze carpet dust in the same manner that soil is to be done.

The legally enforceable standards in Maryland and Massachusetts are 200 micrograms per square foot for floors, 500 micrograms per square foot for window sills, and 800 micrograms per square foot for window wells. These are all hard surfaces, of course. These standards are also recommended by the U.S. Department of Housing and Urban Development (HUD, 1990, p. 123 - 124).

The proposed standards for lead in dust from hard surfaces are more stringent than the existing standards elsewhere because lead data collected by the Minneapolis Public Housing Authority after abatements followed by two cleanings show that lower standards can be achieved in practice (MPHA, 1990).

Subpart 3. Drinking Water. The EPA standard for lead in drinking water is currently 50 micrograms per deciliter. The EPA is reviewing this standard and may revise it to a more stringent value. The various possible standards make guessing at EPA's ultimate decision an unwise exercise. If and when EPA adopts a more stringent standard, state statute (Minnesota Statutes, section 144.383) requires that the commissioner of Health adopt a drinking water standard that is no less stringent than federal regulation. Consistency with the EPA is reasonable to avoid confusion that could result from having multiple standards that could apply to one water system. This subpart is the same as in the emergency rule.

PART 4750.0400 ASSESSMENT.

The statute is somewhat confusing on this subject because of changes made to the 1989 act during the 1990 session. In Minnesota Statutes, sections 144.851 - 144.862 (1989), the legislature funded four lead-related projects that were to be administered by the MDH and contracted out for state fiscal years 1990 - 1991. One of these projects called for assessments to be performed where a child or pregnant woman is identified with a blood lead level of at least 25 micrograms per deciliter. The 1989 statute was repealed and replaced in 1990 by Minnesota Statutes, sections 144.871 through 144.878, which call for assessments to be done where a child is identified with a blood lead level of 25 micrograms per deciliter or where a pregnant woman is identified with a blood lead level of at least 10 micrograms per deciliter. However, the intent of the legislation was not to change the contracts funded in the 1989 session so Minnesota Statutes, section 144.872, repeated the 1989 language regarding the assessments done under the contracts. The 1990 language on assessments applies to the rules to be adopted by the commissioner of Health and not to these contracts.

Subpart 1. General. This subpart is needed to concisely identify a board of health as the entity having the responsibility to

conduct an assessment and to act on the findings of the assessment. This subpart is reasonable since it is consistent with the requirements in Laws of Minnesota, 1990, Chapter 533, section 5, as codified into Minnesota Statutes, section 144.874, subdivisions 1 and 3. This subpart does not extend authority to conduct an assessment of a residence or to order abatement of a residence to any person or agency other than a board of health, nor does this subpart limit existing authority to inspect residences for compliance with health or housing codes or to order compliance with health or housing codes.

Subpart 2. Assessment required. Laws of Minnesota, 1990, Chapter 533, section 5, as codified into Minnesota Statutes, section 144.874, subdivision 1, require a board of health to assess the residence of a child with an elevated blood lead level or of a pregnant woman with a blood lead level of at least ten micrograms per deciliter. This statute requires a board of health to conduct an assessment according to rules adopted by the commissioner. Recall the discussion above under Part 4750.0400 Assessment regarding the differences between the 1989 and 1990 statutes requiring that assessments be done when a child is identified with a blood lead level of 25 micrograms per deciliter or a woman is identified with a blood lead level of at least 10 micrograms per deciliter. Minnesota Statutes, sections 144.871 to 144.878, (1990) apply here.

A board of health is not limited to conducting assessments to those required by the proposed rules. The proposed rules are consistent with Minnesota Statutes, section 144.874, regarding assessments but the statutory approach is "secondary prevention". This means that action is only required <u>after</u> identification of a child with an elevated blood lead or pregnant woman with a blood lead level of at least 10 micrograms per deciliter. "Primary prevention" means that measures are taken to prevent these blood lead levels from occurring in the first place. Primary prevention is the ideal in public health practice. Secondary prevention is the customary practice in lead poisoning prevention programs only because the large staff and funding resources needed for primary prevention are lacking. As resources increase, a board of health may wish to begin primary prevention and is not precluded from doing so by this rule. This subpart does not extend authority to conduct an assessment to any person or agency other than a board of health, nor does this subpart limit existing authority to inspect residences for compliance with health or housing codes.

Subpart 3. Abatement required. Laws of Minnesota, 1990, Chapter 533, section 5, as codified into Minnesota Statutes, section 144.874, subdivision 3, require a board of health to order the property owner to perform abatement on a lead source that exceeds a standard in rules adopted under Laws of Minnesota, Chapter 533, section 7, as codified into Minnesota Statutes, section 144.8787, in the residence of a child with an elevated blood lead level or

a pregnant woman with a blood lead level of at least ten micrograms per deciliter.

This subpart is needed to implement the statutory requirement for boards of health to order abatement where an assessment identifies a violation of lead standards. It is reasonable to specify in rules that boards of health must order abatement of lead sources in violation of residential lead standards adopted by the Minnesota Department of Health and by the Minnesota Pollution Control Agency. This subpart does not extend authority to order an abatement to any person or agency other than a board of health, nor does this subpart limit existing authority to order compliance with health or housing codes.

Subpart 4. Paint. Testing of paint from each type of surface, such as a wall, floor, window, ceiling, and fixture, is needed because an adequately accurate prediction of the lead present cannot be based solely on the age of the structure or any other readily apparent characteristic of the structure. Prior to 1950, lead-based paint commonly contained 40% to 60% lead (NIBS, 1988, page 26). During the 1950's, paint manufacturers voluntarily reduced lead content to an average of 1% as other pigments came into use. Lead compounds were used in concentrations of 0.5% to 1% as drying agents in paint. Never was all paint lead-based nor did all lead-based paint contain the same concentration of lead.

Testing of every painted surface would be very costly and time consuming without actually improving the situation. It is thus reasonable to require that each type of surface be tested but not require that every surface be tested. For example, a wall with deteriorating paint must be tested but not every wall in the residence must be tested. Given the wide variety of housing types and conditions, a board of health must be able to exercise judgment in selecting particular surfaces at the residence. If a room has the same color paint on all of its walls and this paint appears to be in a similar condition on all of the walls, then a sample of paint from one wall can reasonably be assumed to represent the lead content of the paint on all of the walls. This judgment is limited in that surfaces that have deteriorating paint or that are accessible to small children must be tested. Only paint that violates a standard is required to be abated. This subpart differs from the corresponding emergency rules subpart due to comments from the Minneapolis Health Department that requiring testing of every surface is too expensive and time-consuming and of limited benefit.

Item A. X-ray fluorescence analyzers are commonly used by regulatory authorities for measurement and regulation of the lead content of painted surfaces (see table 6). X-ray fluorescence analyzers are commercially available from PGT, Inc. and Warrington Labs. Field X-ray fluorescence analyzers take lead measurements without damaging the painted surface of interest. The measurements so taken are available immediately. Thus, an X-ray fluorescence

analyzer is a useful and a reasonable method of sampling and analyzing paint samples for lead. This item is the same as the corresponding emergency rule item.

Item B. The "Test Methods for Evaluating Solid Waste, 1A: Laboratory Manual for Physical/Chemical Methods", Chapter 3, Acid Digestion of Sludges and Soils, September 1986, provides the EPA's standard methods for solid waste analysis. Within this document, the methods for lead analysis are listed in Chapter 3 as methods - 6010: Inductively Coupled Plasma Atomic Emission Spectroscopy; - 7420: Lead (AA, Direct Aspiration); and - 7421: Lead (AA, Furnace Technique). AA stands for "atomic absorption" and refers to atomic absorption spectroscopy which is an analytical instrument with several variations. This item is the same as the corresponding emergency rule item.

The methods cited in item B are appropriate for paint because lead is soluble in acid and will be either in solid form (if removed by mechanical methods) or in sludge form (if removed by chemical stripping). It is necessary to require that standard methods be used in the analysis of lead in dust wipe samples because this will result in reliable analytical results. It is also reasonable to believe that EPA has expertise in such analysis because EPA has long been responsible for regulating solid and hazardous wastes and has a large technical staff.

Subpart 5. Dust. In collecting dust samples, testing of every surface would be very costly and time consuming without actually improving the situation. It is thus reasonable to require that each type of surface be tested but not to require that every surface be tested. For example, dust on a window sill must be tested but not every window sill must be tested. Wipe samples are required from hard surfaces but not from soft surfaces (such as carpeting or rugs) because sampling dust from soft surfaces requires a vacuum method, which is discussed below. The wide variety of housing types and conditions mean that a board of health must be able to exercise judgment in selecting particular surfaces at the residence. Collection of dust samples from surfaces that are the most visibly dusty can reasonably be assumed to represent the lead in dust of the residence. Only surfaces that violate a standard in part 4750.0300 are required to be abated.

Since there is no uniformly accepted standard method for dust collection from a hard surface, a dust wipe method is prescribed. This method is adapted from the recommendations of HUD (HUD, 1990, page A5-32). HUD contracted with the National Institute of Building Sciences (NIBS) for this guideline document. The dust wipe method is easy to perform and is therefore reasonable. It is also reasonable to believe that NIBS and HUD are knowledgeable in housing since this is their areas of expertise. This subpart differs from the corresponding emergency rules subpart in response to comment by David Jacobs of the Georgia Tech Research Institute

that this wipe method (which is designed for residential use) is more appropriate than the method cited in the emergency rules (which is designed for industrial use).

The analytical methods for dust wipe samples are the same as for paint ["Test Methods for Evaluating Solid Waste, 1A: Laboratory Manual for Physical/Chemical Methods", Chapter 3, Acid Digestion of Sludges and Soils (September 1986)]. These methods are reasonable for dust because dust and the wiping material are solid rather than liquid or gaseous. It is necessary to require that standard methods be used in the analysis of lead in dust wipe samples because this will result in reliable analytical results. This method is the same as that for dust analysis in the emergency rule.

Dust samples must also be taken from carpeting which may act as a reservoir for lead dust and cause lead exposure to people. This method to collect dust samples from carpeting has been validated and published in the scientific literature (Que Hee, 1985).

The proposed analytical method for carpet dust samples is the same as that for soil lead analysis because soil lead is a major contributor to carpet dust lead and because enough dust can be recovered from a carpeting to perform a weight-per-weight analysis.

Information regarding the sampling process is needed to allow for planning of abatement, review of the adequacy of sampling, and comparison of pre-abatement analytical results with post-abatement analytical results.

This subpart differs from the corresponding emergency rule subpart due to comments from the Minneapolis Health Department that requiring every surface to be tested is too expensive and time-consuming and of limited benefit. This subpart also differs from the emergency rules in requiring dust sampling of carpets.

Subpart 6. Drinking water. Drinking water quality is regulated by the EPA. Therefore, use of the EPA-approved school water sample collection method for public fountains is reasonable. It is reasonable to believe that EPA has expertise regarding drinking water analysis since EPA has long had responsibility for regulating drinking water and has a large technical staff to do so. This subpart is the same as the corresponding emergency rules subpart.

Subpart 7. Soil. This subpart establishes soil sampling procedures required for collecting soil samples at a residence. This procedure applies to a residence where there is a person with an elevated blood lead. However, the proposed rules provide an option to avoid the need to test soil. If the owner of the residence which is suspected to have lead contamination agrees to treat the bare soil by the required abatement methods, then soil samples are not required from the different areas in a residence. This is a

reasonable option to reduce the cost of sampling and analysis where proper abatement will be performed.

Public health is protected by abatement without soil assessment because the waiting period for laboratory analysis data is eliminated. The turn-around time for soil samples is five days to 21 days, depending on the laboratory used. During this waiting period, lead exposure could occur. Alternatively, if soil sampling is necessary, then the sampling requirements of subpart 7 must be met. The analytical method required for soil samples is "Determination of Lead in Soil" prepared in July 1990 by the Soil Testing and Research Analytical Laboratories of the Department of Soil Science/Agricultural Experiment Station at the University of Minnesota. This method measures "bioavailable" lead, i.e., the lead that is sufficiently soluble in weak acid to be dissolved in the human stomach. It is reasonable to believe that the Soil Testing and Research Analytical Laboratories have expertise in analyzing lead in soil.

Item A requires a map of the residential property. This is necessary for proper site identification of the different locations of bare soil in a property. Drawing a map at the residence is also necessary for record keeping purposes.

Item B requires that the mapped area must identify areas of bare soil and that those areas be characterized by sample location. Composites of each soil sample location are to be collected from bare soil areas.

Studies in Minnesota (MPCA, 1987) have demonstrated that different soil sample locations exhibit varying concentrations of soil lead. For example, foundation areas adjacent to painted houses or structures have high lead concentration and lead concentrations decline as the distance increases from the house. Streetside soils have high lead concentrations due to automobile emissions. It is reasonable to make a distinction between different samples taken from different locations within a property because the lead concentrations vary among soil locations.

Item C requires that a composite sample of five to ten subsamples be collected for each soil sample location. This is reasonable because it is representative of the lead found in a particular area (McIntyre, 1988).

Item D requires that a standard soil sampling tube or a putty knife be used as soil sampling tools. The sampling tool must be clean and not contain lead. These are readily available.

Item E requires that random samples be collected to a depth of 2 centimeters and include the soil surface. Researchers report that the highest concentrations of soil lead are found on or near the surface of the ground (Madhavan, 1989, p. 136). Once lead is

in this portion of the ground, it does not move through the soil and thus remains available to children during play activities.

Item F requires that soil samples be labelled with the date of sampling, addresses of property, bare soil sample location, and name of the person who collected the sample. Since many soil samples must be collected at one time, proper labelling is necessary to avoid confusion and sometimes loss. Proper labelling also insures that there is a chain of custody from sample collection to laboratory analysis.

Items A to F are reasonable because they provide procedures that provide guidance to a board of health to characterize the situation and focus on the areas of concern in a residential property with lead contaminated soil. Since the objective is to reduce the health risk of lead in soil, this procedure will allow for representative and accurate sampling of different soil sample locations that is important to achieve this end.

Subpart 8. Specifying the method for assessment of soil in an area larger than a residence is needed to allow boards of health to conduct such assessment in a valid manner. Because soil lead abatement is likely to be less expensive than abatement of other lead sources, a board of health may find the resources to perform primary prevention in regard to soil lead. However, if the board of health undertakes such an effort, it is necessary to require that the assessment be done in a manner that ensures representative samples and accurate analysis to avoid improper abatement efforts.

PART 4750.0500 LEAD ABATEMENT METHODS.

Minnesota Statutes, section 144.878, subdivision 2, paragraph (a), (Laws of Minnesota, 1990, Chapter 533, section 7) requires adoption of rules on abatement of lead in paint, dust, and drinking water. Abatement of lead-based paint must be done in very controlled circumstances or the lead hazard is made much worse by dispersing the lead in readily ingestible dust and small particles. This is a well-established and fundamental fact of lead-based paint abatement (Illinois 1986, page 3; Baltimore, 1987, page 8; Amitai et al, 1987, page 758; Sayre, 1987, page 727; NIBS, 1988, pages 28 - 29; ATSDR, 1988, page IX-23; HUD, 1990, page 4).

Subpart 1. General. Specifying that any person performing lead abatement must do so according to the requirements of these rules is necessary to conform with Minnesota Statutes, section 144.878, and to prevent lead exposure to people. Improper abatement is hazardous regardless of who performs the abatement. Therefore, this requirement is needed to protect public health as required by Minnesota Statutes, section 144.878. The requirement that abatement ordered by a board of health not begin until either an assessment of possible lead sources has been done by the board of health or the property owner agrees to treat all paint, dust, and drinking

water according to approved abatement methods is necessary to prevent improper lead abatement and lead exposure to people. An assessment may show that only part of the property needs to be abated but situations may exist where the entire property is reasonably believed by the property owner to be in violation of the standards and, to expedite abatement, agrees to perform abatement without first having an assessment performed by the board of health. The property owner is not prevented from performing abatement work, with or without an order from the board of health, but must do so according to the provisions of these rules. This subpart differs from the emergency rules to allow faster response and reduce costs where the property owner is in agreement that abatement is needed.

Subpart 2. Paint abatement preparations. Requiring that abatement not begin until the preparations are made is necessary to prevent dispersal of the lead-bearing dust and debris that results in lead exposure to people. This subpart is the same as the corresponding emergency rule subpart.

Item A. Requiring preparations to minimize generation and dispersal of lead dust and having waste collection materials on-site prior to abatement is needed to reduce lead hazard to abatement workers and residents by ensuring that waste can be immediately enclosed. Delay in enclosing the waste allows time for the waste to be dispersed and this must be avoided to protect public health. Since the waste must be cleaned up in any case, it is reasonable to require that it be done promptly. This item differs from the corresponding emergency rule subpart only in deleting a reference to Pollution Control Agency rules which apply of their own authority.

Item B. Notifying the occupants of a residence of the presence of lead-based paint and of the schedule for abatement is needed because the occupants can take measures to reduce the hazard to themselves while abatement is being arranged and may need to arrange for temporary housing during the abatement project. This item is the same as the corresponding emergency rule subpart.

Item C, subitem (1). Minnesota Statutes, section 144.874, subdivision 3, requires repair of any source of damage, such as leaking roofs and plumbing, to lead-containing surfaces. This is needed in the proposed rule because it is very easy to overlook this requirement if sources of damage are not sought out. Since this does not add any requirement beyond that in the above-cited statute, it is reasonable to include it in the proposed rule. This subpart differs from the corresponding emergency rule subpart to conform more closely with the above-cited statute.

Item C, subitem (2). Minnesota Statutes, section 144.874, subdivision 4, require that a board of health ensure that residents are relocated from rooms or dwellings during abatement that

generates leaded dust. This is needed in the proposed rule to make the boards aware of the statutory requirement. Failure to relocate residents during abatement has caused lead poisoning in the past (Amitai et al, 1987, page 760). Since this does not add any requirement beyond that in the above-cited statute, it is reasonable to include it in the proposed rule. This item is the same as the corresponding emergency rules subpart.

Item C, subitem (3). Not all of the painted surfaces of a housing unit will necessarily contain lead nor will all rooms of a unit necessarily contain any lead. Sealing those rooms with lead-based paint from rooms without is needed to prevent lead dispersal from abatement work areas to other rooms of the residence. Covering heating vents is also necessary to prevent lead dust and debris from settling into these vents and subsequently being blown back into the living space. The use of six mil thickness tarpaulins is needed because sturdy material is needed for construction work and abatement projects are construction work (HUD, 1990, pages 95 - 99). The proposed rule allows six mil "or equivalent" thickness because other thicknesses are commonly available. This item is the same as the corresponding emergency rule subpart.

Item C, subitem (4). Covering fixtures, furniture, and carpeting that are not to be abated but which are not removable from abatement work areas is needed to minimize contamination of these items and subsequent lead exposure to residents. Carpeting is not removable if it is fastened so securely to the floor that it cannot be removed without damage to the carpeting. Covering with plastic is inexpensive and effective and is therefore reasonable. This item is the same as the corresponding emergency rule subpart.

Item C, subitem (5). Using tarpaulins both inside and outside of a door or window that is to be abated is needed to contain lead debris likely to fall on either side of the door or window. Children play both inside and outside of homes, at least in summer, and could be exposed to lead that has fallen either inside or outside of an abated window. Plastic is inexpensive and effective and is therefore reasonable. This item is the same as the corresponding emergency rule subpart.

Item C, subitem (6). Requiring that "other preparations due to unusual circumstances such as unique structural components affecting the work area must be taken as needed to prevent dispersal of lead from abatement procedures" is needed because the wide variety of pre-1977 housing styles that have lead-based paint precludes foreseeing all possible situations. Since a specific situation may call for a unique preparation, it is reasonable to provide for such situations. A board of health issuing abatement orders pursuant to Minnesota Statutes, section 144.874, subdivision 3, may take note of unique structural components in issuing orders. Preparations may go beyond those specifically required in the proposed rules. However, if innovative abatement methods are

proposed by the abatement contractor, then a variance must be obtained prior to abatement work to comply with Minnesota Statutes, section 144.878, subdivision 3, (Laws of Minnesota, 1990, Chapter 533, section 7) and with part 4750.0800 of the proposed rules. This item is the same as the corresponding emergency rule subpart.

Item D, subitem (1). Advising occupants to remove personal property from the lot before exterior abatement is begun is needed to prevent abatement dust and debris from contaminating the personal property and causing subsequent lead exposure to the occupants. This subitem is the same as the emergency rules.

Item D, subitem (2). The requirements for tarpaulins or plastic in exterior paint abatement work are needed to prevent contamination of soil and possible lead exposure to children who may subsequently play in that soil. The requirements in (a), (b), and (c) of item E, subitem (2), regarding the spatial extent of the tarpaulins, are needed so that the public will know what is adequate coverage. Plastic is inexpensive and effective and is therefore reasonable. This subitem is the same as the corresponding emergency rule subpart.

Item E. To prevent lead exposure to people, it is necessary to require that abrasive blasting, waterblasting, modified-wet abrasive blasting, and vacuum blasting be performed in a manner that contains all lead-contaminated dust or debris for proper disposal. The Pollution Control Agency is required by Minnesota Statutes, section 144.878, subdivision 2, paragraph (c), (Laws of Minnesota, 1990, Chapter 533, section 7) to adopt rules on exterior abrasive blasting. When adopted, these rules will apply of their own authority. MDH intends that compliance with the Pollution Control Agency rules on abrasive blasting will satisfy the requirements of this item. This item differs from the corresponding emergency rules item to conform with the statute which gives authority for regulating abrasive blasting methods to the Pollution Control Agency in the permanent rules, unlike the emergency rules.

Subpart 3. Paint abatement methods. Requiring that lead-based paint be removed by the abatement methods specified in this subpart is needed to comply with Minnesota Statutes, subdivision 144.878, subdivision 2, paragraph (a). It is reasonable to provide the public with abatement methods that are known to be effective and safe, if properly done. This subpart is the same as the corresponding emergency rule subpart on this matter which was adopted by MDH.

Item A, subitem (1). Deteriorating paint presents an immediate lead exposure hazard and must be removed. Removal of the substrate and replacement with new substrate that complies with the lead in paint standard may be the safest method for abatement of deteriorating paint. The safety of this method arises from minimizing (but not eliminating) the amount of lead dust and paint

chips that are generated and thereby minimizing the potential lead exposure to both abatement workers and residents. Since removal and replacement may be the safest method, it is reasonable to allow use of this method. This subitem is the same as the emergency rule.

Item A, subitem (2)(a). Misted scraping of deteriorating paint is allowed because this method is effective in removing paint. Misting with water while scraping is needed because dispersal of dust is minimized during work. This protects the abatement worker. Vigorous containment and cleanup methods will be still be needed because the dust and debris may dry before final clean-up. Misted wire brushing is similarly effective in removing deteriorating paint and will require the same vigorous cleanup. Since small amounts of water are used in misting, it is reasonable to require that misting be used with both scraping and wire brushing. This is the same as the emergency rule language.

Item A, subitem (2)(b). Chemical stripping is quite different from scraping or brushing in not generating loose dust or chips. However, stripping generates a pasty sludge that must be scraped from the substrate. Requiring direct placement of lead-contaminated stripper sludge into leak-proof containers is needed to minimize the opportunity for dispersal of the lead waste. Since the sludge has to be cleaned up in any case, it is reasonable to require that it be done promptly. Stripping leaves a lead-bearing film on the substrate that must be washed off, which is most effectively done with a phosphate detergent. Since the lead-bearing film must be cleaned up in any case, it is reasonable to require that the most effective method be used to do so. This is the same as the emergency rule language.

Item A, subitem (2)(c). Heat guns are used to soften paint so it may be more easily scraped off. Heat guns operating above 700 degrees Fahrenheit may vaporize the lead which forms an inhalable fume upon cooling (HUD, 1990, page 104). This is a hazard to the worker and, unless these very small particles are vigorously cleaned up, is also a hazard to residents when they reoccupy the residence. Since other abatement methods are available and some heat guns operate at less that 700 degrees Fahrenheit, it is reasonable to limit the operating temperature of heat guns used for abatement. This subitem differs from the corresponding emergency rules subitem due to a comment pointing out the HUD recommendation of 700 degrees Fahrenheit.

Item A, subitem (2)(d), (e), (f), and (g). Abrasive blasting, waterblasting, modified-wet abrasive blasting, and vacuum blasting are effective methods of removing surface coatings, including lead-based paint. However, the energy imparted to the paint makes containment of waste such a problem that only vacuum blasting can safely be used in living space. Interior waterblasting is allowed only on masonry or stone basements where rough surfaces may not be suitable for any other abatement method.

Item B. The requirement that damaged substrate be patched to a smooth surface is needed to seal any lead that may have been forced into the damaged substrate and to allow proper refinishing of the substrate. This is the same as the emergency rule language except for the clarification that patching of damaged substrate must result in a smooth surface.

Item C, subitem (1). The removal methods that are effective for deteriorating paint are also effective for intact paint. The previous support for the need and reasonableness of methods for deteriorating paint also apply to intact paint.

Item C, subitem (2). Intact paint may be encapsulated with impervious material rather than removed because intact paint does not present an immediate hazard and because removal methods may generate lead dust and chips that must be vigorously cleaned up. Caulking of seams in encapsulating materials is needed because the underlying paint will deteriorate eventually and must be prevented from falling out from behind the encapsulant (HUD, 1990, page 76). Examples of impervious materials reasonably explain what materials are effective without prohibiting other materials which may become available in the future or which may be available now but are unknown to the MDH. This subitem differs from the corresponding emergency rule subitem to conform to a change in the statute in 1990. (Minnesota Statutes, section 144.878, subdivision 2, requires that intact paint can only be ordered to be abated if the commissioner or political subdivision finds that intact paint is accessible to children as chewable or lead-dust producing surface and is a source of actual lead exposure. A property owner may voluntarily abate intact paint.)

Subpart 4. Prohibited paint abatement methods. Some methods of paint removal are sufficiently hazardous that they need to be prohibited to protect the abatement workers and residents. Since other methods are effective and less hazardous, these prohibitions are reasonable.

Items A and B. Open flame torches and heat guns above 700 degrees Fahrenheit are prohibited because these methods generate lead fume which is easily inhaled due to its small particle size (HUD, 1990, page 104). Regarding inhaled lead particles, ATSDR stated that "(e)ssentially all of the deposited amount is absorbed over a very short time" (ATSDR, 1988, page III-2). Burning has been described as "very hazardous because it creates dangerous lead fumes" (Feldman, 1978, page 1143). Burning has been described as a "particularly dangerous" method of lead removal because of the "minute lead particles" generated (Amitai et al, 1987, page 760). These items differ from the emergency rules items only in making the previously noted change from 800 to 700 degrees for heat guns.

Items C and D. Dry sanding manually or with a power sander are the worst methods for lead-based paint removal because large

quantities of small particles are generated which presents an immediate hazard to the workers and are difficult to completely clean up (Chisolm, 1989, page 236). Using a high efficiency particulate air filter vacuum attachment on a power sander alleviates the hazard. These items are the same as the corresponding emergency rule items.

Item E. Dry scraping and dry wire brushing are prohibited because, although they generate less dust than some other methods, it is necessary to minimize lead dust to protect both workers and residents. The use of misting with scraping and wire brushing is an effective way to minimize lead dust. This item was added in response to comments to this effect made by David Jacobs of the Georgia Tech Research Institute.

Item F. Methylene chloride is a suspected carcinogen so its use in chemical strippers is prohibited for lead-based paint removal. This prohibition is needed to prevent methylene chloride exposure to abatement workers and possibly residents if clean-up is less than ideal. It is illogical to bring one very hazardous material (methylene chloride) into a residence to clean up another very hazardous material (lead) so it is reasonable to prohibit this practice. This item is the same as the emergency rule item.

Item G. Using water spray to remove chemical strippers from treated surfaces disperses the lead in the spent stripper and thereby increases exposure potential and cleanup problems. It is therefore necessary to prohibit this method. Since scraping of spent stripper is feasible, it is also reasonable to prohibit use of sprayed water for removing strippers. This item is the same as the corresponding emergency rule item.

Item H. A prohibition is needed on contact paper, wallpaper of less than 21 ounces per square yard, and new paint as encapsulants because each of these materials is too readily removed from the underlying surface and thereby can allow renewed lead exposure (HUD, 1990, page 76). Wallpaper of 21 ounces per square yard has been used effectively by the public housing authority in Columbia, South Carolina (Columbia, 1987, page 7). This item differs from the emergency rule in deleting "ordinary" wallpaper and adding the weight criterion as a clarification.

Item I. The interior use of abrasive blasting and modified-wet abrasive blasting is prohibited because dispersal of lead waste in the residence is unavoidable (Feldman, 1978, page 1143). Since this would result in lead exposure to the residents, prevention of this dispersal is needed. Interior waterblasting is allowed only on masonry or stone basements where rough surfaces may not be suitable for any other abatement method. Waterblasting is not suitable for living space due to the difficulty in containing and cleaning up waste. Since effective and safe methods of lead abatement are provided in subpart 2, prohibition of unsafe methods

is reasonable. Allowing interior vacuum blasting is reasonable because the vacuum prevents dispersal of lead wastes and prevents subsequent lead exposure to the residents. This item differs from the emergency rule item in allowing waterblasting in basements.

Subpart 5. Dust abatement. Much of the lead in dust is in the smallest particle size (Baltimore, 1987, page 50). The small particles of lead dust will pass through an ordinary household vacuum cleaner and therefore require use of a high efficiency particulate air filter (Chisolm, 1989, page 237; HUD, 1990, p. 112) and require prohibition on use of a household vacuum cleaner. The requirement for a clean water rinse of trisodium phosphate solution is needed because residual solution will contain lead and this must be removed. Waterproof gloves are needed to prevent hand contact with lead removed from the substrate by the trisodium phosphate and to protect the hands from the skin irritation effect of the solution. This subpart differs from the corresponding subpart in the emergency rule in dropping a reference to disposal rules of the Pollution Control Agency which apply of their own authority and in specifying the required concentration of trisodium phosphate in solution. This concentration is the same as that in Maryland (Code of Maryland, Title 26, Subtitle 02.06).

Subpart 6. Waste removal. The requirement for daily removal of waste from the worksite is needed to minimize the opportunity for the waste to be dispersed and cause lead exposure (HUD, 1990, page 115). As it must be cleaned anyway, it is reasonable to require that lead-bearing waste be cleaned up promptly. This subpart differs from the corresponding subpart in the emergency rule only in dropping a reference to the Pollution Control Agency's disposal rules which apply of their own authority.

Subpart 7. Final cleanup. Requiring that final cleanup proceed downward from the highest point abated or exposed to dust or debris from abatement and outward from the room farthest from the exit is needed to minimize any recontamination by lead waste being tracked or spilled onto previously cleaned surfaces (HUD, 1990, page 116). This recontamination would subsequently cause lead exposure to people. Since final cleanup must be done in any case, it is reasonable to require that it be done in a manner that does not defeat the purpose of final cleanup.

The discussion above regarding household vacuum cleaners, high efficiency particulate air filter and trisodium phosphate abatement of dust also applies to final cleanup. Final cleanup is primarily directed at dust because daily cleanup removes debris.

Delaying interior cleanup for 24 hours after the completion of abatement is needed to allow any airborne lead dust to settle and therefore be removed in the final clean-up (HUD, 1990, page 111). A one-day delay is minor and a reasonable requirement so that leaded dust has time to settle and be removed in final cleanup.

Requiring that exterior cleanup be completed no later than seven days after completion of abatement is needed to minimize the potential for dispersal of the waste. If the requirement for daily removal of visible waste is followed, then final cleanup within seven days is reasonable because large quantities of debris will not have to be removed, only small quantities of dust will have to be removed. Rain gutters are singled out for cleaning because waste that settles in them would not be readily visible from below and because such waste is likely to get washed down to the ground by rainfall and cause lead exposure to children playing around the residence. The requirement that all surfaces that have been abated or exposed to waste from abatement would include rain gutters even if rain gutters were not singled out. This subpart differs from the corresponding subpart in the emergency rule in expanding the language to clarify how final cleanup is to proceed.

Subpart 8. Drinking water. Drinking water that exceeds the standard for lead can be abated by disconnecting or flushing the plumbing fixture at which the violation was detected or by use of bottled water or an alternative potable water source. These abatement methods are reasonable because they are effective and inexpensive compared to replacement of the plumbing system. The MDH believes that replacement of the plumbing system is not justified since the health hazard can be avoided by other methods.

PART 4750.0600 REASSESSMENT.

Criteria describing acceptable completion of abatement is needed because the public needs to know how clean is clean enough. This part title (reassessment) differs from that in the corresponding emergency rules part (retesting) to have consistency in terms but this is not a substantive change.

Subpart 1. Reassessment required. Abatement of lead-based paint generates leaded dust and debris. The dust may not be obvious so sampling and analysis of dust from surfaces is needed to demonstrate that final cleanup has been successful. Dust testing is the appropriate method for determining compliance after abatement of deteriorating paint, intact paint, and dust.

X-ray fluorescence analyzers are not used for reassessments because:

1. deteriorating paint that has been removed will likely have left lead residue in the substrate which is not removable without removing the substrate but which will register on the X-ray fluorescence analyzer;

2. deteriorating paint or intact paint that has been removed with the old substrate and that has been replaced by new substrate with new paint does not need to be tested; and

3. lead dust may give a low reading on the X-ray fluorescence analyzers even though presenting a lead hazard because the small particle size of dust makes it readily ingested and absorbed.

This subpart differs from the corresponding emergency rules subpart due to comments from the Minneapolis Health Department on the staff time required to test every surface (per the emergency rule) rather than representative surfaces (per the proposed permanent rule).

Subpart 2. Sample collection. As with pre-abatement assessments, post-abatement sampling and analysis of dust from every surface would be very costly and time-consuming so it is reasonable to require that a representative of each surface be tested. Since the surfaces that need to be assessed after abatement depend on which surfaces were actually abated or exposed to dust from abatement, it is reasonable to allow the board of health to exercise judgment in selecting surfaces. This subpart differs from the corresponding emergency rule subpart due to comments from the Minneapolis Health Department on the cost of testing.

Subpart 3. Sample analysis. Requiring the same standard methods for post-abatement dust analysis as was required for pre-abatement analysis is reasonable because this is less expensive than requiring different methods that would necessitate additional analytical equipment and training in the use of this equipment. Consistency of methods is also needed to provide comparable results. This subpart is the same as the emergency rule subpart.

PART 4750.0700 LEAD ABATEMENT CONTRACTOR DUTIES.

Subpart 1. Equipment required. Although the most vulnerable groups for lead toxicity are children and pregnant women, exposure to lead is hazardous to an abatement worker (Feldman, 1978, page 1144). Abatement workers have been known to bring enough lead dust home on their work clothes to cause lead toxicity in their own children (Feldman, 1978, pages 1143 - 1145). Requiring personal protective equipment is reasonable to prevent exposure. Although disposable coveralls and cleaning materials are often used, this is not always so. Again because of the hazard of workers bringing lead home, it is necessary to require that reused clothing and cleaning materials be laundered separately from other non-lead items. This subpart differs from the emergency rule in regard to the reused clothing and cleaning materials.

Subpart 2. Prohibited actions. Ingestion and inhalation of lead particles in abatement work areas is unavoidable if people eat, drink, or smoke in the areas. Prohibiting these activities is needed to prevent lead exposure (HUD, 1990, page 53). As with any construction worksite, abatement workers may leave the worksite on breaks, so it is reasonable to prohibit on-site eating, drinking, and smoking. This subpart differs from the corresponding emergency rule subpart only in rewording for clarity, as suggested by the Office of the Revisor of Statutes.

Subpart 3. Registration. Provision of procedures as to how and when contractors are to register as required by Minnesota Statutes,

section 144.876, is needed since this was not addressed in the statute. Required is identification of the contractor's company and at least one contact person. These are reasonable minimum requirements to identify the registrant. This subpart differs from the corresponding emergency rule in specifying the procedure.

PART 4750.0800 VARIANCES.

Laws of Minnesota, 1990, Chapter 533, section 7, (as codified into Minnesota Statutes, section 144.878, subdivision 3) requires the commissioner of Health to provide variance procedures to allow for innovative abatement methods. This part satisfies the statutory requirement by referring to variance procedures being adopted separately in variance rules for the Environmental Health Division of the Minnesota Department of Health.

X. EFFECTIVE DATE

These rules shall become effective five working days after publication of a notice of adoption in the State Register.

XI. BIBLIOGRAPHY

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11/19/90

SF-00006-05 (4/86)

DEPARTMENT : Health

STATE OF MINNESOTA

Office Memorandum

DATE : November 5, 1990

TO : Legislative Commission to Review Administrative Rules
Room 55 State Office Building
100 Constitution Avenue, St. Paul, Minnesota

FROM : Jane A. Nelson, Rules Coordinator
Environmental Health Division
Minnesota Department of Health

PHONE : 627-5038

SUBJECT : Submissioner of Statement of Need and Reasonableness pursuant to Minnesota Statutes, sections 14.131 and 14.23

In accordance with the above matter, the Minnesota Department of Health is submitting to you the Statement of Need and Reasonableness on proposed rules governing residential lead abatement methods and standards for lead in paint, dust, and drinking water. These rules are scheduled for publication in the State Register November 19, 1990, and would go to hearing, if necessary, December 27, 1990.

JAN:mq
Enclosure