

NATIONAL BUREAU OF STANDARDS REPORT

10 633

RETRIEVAL OF FIELD SAMPLES
OF LEAD BASED PAINT



U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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¹ Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D.C. 20234.

² Located at Boulder, Colorado 80302.

³ Located at 5285 Port Royal Road, Springfield, Virginia 22151.

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RETRIEVAL OF FIELD SAMPLES OF LEAD BASED PAINT

Milestone Report (6)

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ABSTRACT

Leaded paint samples were collected from presently standing residences to permit the evaluation of analytical detection methods. An attempt was made to obtain as many different sample types as possible since chemical interferences present in some paints could cause problems in standard analytical procedures. Recommendations are made for standard sampling procedures.

RETRIEVAL OF FIELD SAMPLES OF LEAD BASED PAINT

1. INTRODUCTION

This report details the observations and recommendations resulting from the retrieval of leaded paint samples from housing known to present a lead poisoning hazard. This survey of real samples of leaded paint will aid the evaluation of analytical detection methods and the determination of the nature of the Standard Reference Material's that will be developed.

The primary effort was the collection of leaded materials from building interiors throughout the country. Since paints can contain various chemical interferences that could cause problems in standard analytical procedures, an attempt was made to obtain an many different sample types as possible.

Since the methods and techniques used to collect samples can affect their analyses, the general evaluation of sampling procedures was also undertaken. This evaluation has resulted in a series of recommendations given at the conclusion of this report which may be helpful to cities that are developing lead paint screening programs.

2. SAMPLE GATHERING

Samples of leaded paint may contain many types of organic coatings, e.g., epoxies, phenolics, water emulsions, alkyds, casein, natural oils, etc. In addition, those areas commonly sampled for hazardous materials (windowsills, radiators, cabinets, baseboards, railings, walls and ceilings) embrace a wide spectrum of paints and paint types. In view of this diversity of conditions, it was necessary to obtain as wide a variety of samples as possible.

Since existing deleading or screening programs offered a means for obtaining samples quickly and also covered a wide geographic area, Public Health officials in cities with major deleading programs were contacted and given an explanation of the NBS-HUD Lead Paint Poisoning Program. Upon request, these officials agreed to submit samples. Five city officials were contacted and have responded with samples. These cities include:

New Haven, Conn.
Chicago, Ill.
Baltimore, Md.

Philadelphia, Penn.
Washington, D.C.

Each city submitted selected samples, of suitable size for analysis, and pertinent data regarding the samples in NBS sampling envelopes. (See Figure I) The data included: building identification by type, location, age and identification of sample source, e.g., bathroom, living room, etc. Figure I, the NBS Lead Paint Poisoning

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P L E A S E C I R C L E
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A P P R O P R I A T E W O R D
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A. D W E L L I N G

1. TYPE: private home ---- apartment ---- other.
2. LOCATION: city ---- suburb ---- country.
3. CONDITION: good ---- going bad ---- poor.
4. ESTIMATED AGE: before 1940 ---- 1940-1960 ---- 1960-1971.

B. S A M P L E [LEAD detected at site? -- Yes -- No. If so, how? (under D).]

1. TYPE: paint chips ---- painted panels ---- plaster ---- putty ---- other.
2. LOCATION: room ---- basement/attic ---- hall ---- outdoors.
3. SURFACE: wall ---- floor ---- ceiling ---- woodwork ---- loose pieces.

C. O C C U P A N T S

1. NUMBER IN FAMILY ____ . HOW MANY CHILDREN 4 YEARS & UNDER ____ .

D. C O M M E N T S

CITY _____ . DATE _____ .

Figure I. NBS LEAD PAINT POISONING PROJECT SAMPLING ENVELOPE FORMAT

Project Sampling Envelope Format, shows the methodology used to characterize paint samples obtained from the field. To date, several hundred samples have been obtained and forwarded to the Analytical Chemistry Division for use in various phases of their effort on the Lead Paint Poisoning Project.

Examination of these samples has revealed variations in composition, surfaces covered and function of those leaded materials, e.g., high reflectivity, low reflectivity, permeability, etc. The average paint chip thickness was 27 mils which lead to the assumption that the average sample was taken from a surface which has received eighteen coats of paint. Samples taken from the above cities are described in Table 1, Characterization of Leaded Paint Samples Obtained from Several Cities.

3. OBSERVATION OF SAMPLING PROGRAMS

An NBS team visited Washington, D.C., Baltimore and New Haven to observe the sample gathering procedures used by those cities.

In Washington, D.C. an X-Ray fluorescence detector was used to scan building interiors for the presence of leaded materials. Upon detection, samples were taken and labelled according to location, e.g., west wall, windowsill, radiator, etc. Ceilings were not tested despite an observation of peeling, flaking, blistering and crumbling paint. However, it was noted that a directive ordered the patching and securing of all loose, flaking, peeling, etc. surfaces. However, baseboards were not tested. Samples were removed with various tools and no standard sample size was specified. Samples were transmitted to a laboratory where determination of lead content was made by atomic absorption apparatus.

Baltimore did not have a portable screening device although an order has been placed for an X-Ray fluorescence detector. Samples were not taken from ceilings. However, a directive ordered restoration similar to that required in the Washington, D.C. program. Samples were removed with various tools but no standard size was specified. Samples were then forwarded to a laboratory for analysis. Previously, Baltimore Health Department officials had used the sulfide method of lead detection, however, the Maryland Department of Environmental Health has decided to use atomic absorption.

The New Haven program, like Baltimore's, did not use a portable detection instrument. However, New Haven did provide a standard scapel-like instrument for sample removal. Samples were then sent to a laboratory for determination of lead content by atomic absorption.

4. RECOMMENDATIONS

Field inspection revealed a need for standard sampling procedures. Thus, the NBS team proposes the following recommendations.

- 1) Preliminary evaluation of portable X-Ray detectors has certain inadequacies. Since detection of the hazard

Age of Bldg. (Years)	Average Paint Thickness in Mils							Average No. of Coats	Years per * Coat
	Baltimore	Chicago	New Haven	Phila- delphia	Washington D.C.	Average Thickness All Cities	Average No. of Coats		
30	28	-	25	-	22	25	13	2.3	
50	28	25	31	-	38	31	16	3.1	
60	-	29	-	39	-	34	17	3.5	
70	34	-	39	37	42	36	18	3.9	

*Assuming 0.002 inch thickness per coat.

Table 1. Characterization of Leaded Paint Samples Obtained from Several Cities

is essential, sensitive and reproducible means of detection must be available. It is recommended that cities confirm the reliability of their X-Ray fluorescence units.

- 2) Many cities specify neither sampling from the ceiling nor removal of that hazard to any reasonable degree of permanency even though it is one of the most frequent sources of flaking, peeling and blistering paint. It is recommended that sampling and inspection of ceiling surfaces be required.
- 3) At the present time, very random sampling procedures are being followed by those cities concerned. It is recommended that all walls be sampled in at least three locations at a height no greater than four feet and from each third of the wall.
- 4) It is recommended that a standard tool of removal, for example, a 1-inch chisel be used. This tool is sharp, designed for controlled penetration and permits a selection of sizes, dependent upon the sample size desired.
- 5) It is recommended that sample size, as well as depth (to the substrate) be specified. Both of these factors must be controlled to assure consistent and reliable sampling of all of the hazardous material that may be present on walls.
- 6) The most obvious inadequacy in the sampling program is the lack of thoroughness in sampling. It is recommended that hazardous materials on intact walls and/or ceilings be sampled. Because they do not represent an immediate hazard they are frequently not sampled even though they represent a potential hazard.
- 7) Although samples are usually removed from walls in poor condition, walls in good condition should also be sampled. It is recommended that a tinting and patching kit be used for repairing those areas from which samples are taken. This should contribute to occupant acceptance of a sampling program, which might otherwise arouse the ire of those residents concerned.
- 8) The prevalence of putty along window sashes, sills and other joints presents an accessible source of hazardous materials in dilapidated buildings. It is recommended that sampling and inspection of areas with putty be required.

