

leasing properties where no lead-based paint is identified, it is strongly recommended that owners retain inspection reports for the life of the building, in order to prove that leases in the building are exempt from the disclosure rule. Owners may wish to make arrangements with inspectors to store their copy of the report for longer than the 3 years required of the inspector (40 CFR 745.227(i); this also applies to risk assessment reports). (See Appendix 6 for more information on the Disclosure Rule.)

## V. Inspections in Multi-family Housing

This section emphasizes the additional considerations for random sampling of large housing buildings or projects. The protocols mentioned in earlier sections are not repeated here. It will be necessary to read section IV on single-family housing to implement the protocol for multi-family housing.

Use of the multi-family protocol is less time-consuming and more cost effective than inspecting all units in a given housing development or building because in most instances a pattern can be determined after inspecting a fraction of the units. The number of units tested is based on the date of construction and the number of units in the housing development.

- ◆ For purposes of this chapter only, multi-family housing is defined as any group of more than four units that are similar in construction from unit to unit.

### A. Statistical Confidence in Dwelling Unit Sampling

The number of similar units, similar common areas or exterior sites to be tested (the sample size) is based on the total number units, similar common areas or exterior sites in the building(s), as specified in Table 7.3. Use the table for sampling each set of similar units, each set of similar common areas, and each set of exterior sites, separately (that is, do *not* add the number of units, common areas and exterior sites, and then use the table for the total). For pre-1960 or unknown-age buildings or developments with 1,040 or more similar units, similar common areas or exterior sites, test 5.8 percent of them, and round up any fraction to the next whole number. For 1960-77 buildings or developments with 1,000 or more units, test 2.9 percent of the units, and round up any fraction to the next whole number. For reference, the table shows entries from 1500 to 4000 in steps of 500. For example, in a development built in 1962, with 200 similar units, 20 similar common areas, and 9 similar exterior sites, sample 27 units, 16 common areas, and all 9 exterior sites.

If lead levels in *all* units, common areas or exterior sites tested are found to be below the 1.0 mg/cm<sup>2</sup> standard, these sample sizes provide 95 percent confidence that:

- ◆ For pre-1960 housing units, less than 5 percent or fewer than 50 (whichever is less) units, common areas or exterior sites, have lead at or above the standard; and
- ◆ For 1960 to 1977 housing units, less than 10 percent or fewer than 50 (whichever is less) units, common areas or exterior sites, have lead at or above the standard.

The National Survey of Lead and Allergens in Housing (<http://www.hud.gov/offices/lead/researchers.cfm>) showed that there are fewer lead paint hazards in 1960-1977 housing than in older housing (Jacobs et al., 2002). A higher margin of error was allowed for 1960-1977 housing units to focus resources on housing with the greatest hazards. Refer to Appendix 12 of these *Guidelines* for the statistical calculations for this table. The Appendix shows the details of the calculation for pre-1960-1977 housing, which are the same for 1960-1977 housing except for using the 10 percent criterion rather than the 5 percent criterion used for older housing.

Although the data set used to develop sample sizes in multi-family housing was not randomly selected from all multi-family housing developments in the nation (no such data set is available), analyses drawn from the data are likely to err on the side of safety and public health for at least two reasons: First, the prevalence and amounts of lead-based paint are highest in pre-1960 housing developments. The sampling approach used here focuses inspection efforts on buildings where a greater chance of lead-based paint hazards exist.

The statistical rationale and calculations used to develop sample sizes in multi-family housing is based on a data set which contains approximately 164,000 XRF readings from 23,000 room equivalents in 3,900 units located in 65 housing developments. Statistical and theoretical analyses completed for HUD are available through the Lead Clearinghouse at 1-800-424-LEAD and in Appendix 12.

Second, and perhaps more important, none of the 65 developments had lead-based paint in 5 to 10 percent of the units. That indicates lead-based paint in this range is likely to be quite rare and that plausible increases in sampling to improve detection in this range will fail to improve confidence in the results significantly. Most painting follows a pattern: Property owners or managers often paint all surfaces, all components within a room, or similar components in all rooms in a unit when there is tenant turnover. It is unlikely that lead-based paint distributions are completely random, as assumed in the 1995 edition of the *Guidelines*. From the available data, there appears to be no significant benefit to increasing the number of units to be sampled to detect a prevalence rate of 5 to 10 percent, because few developments are likely to be in that range. In short, the sampling design presented here will yield a more targeted, cost-effective approach to identifying lead-based paint where it is most likely to exist.

#### **B. Selection of Housing Units, Common Areas, and Exterior Site Areas.**

The first step in selecting housing units is to identify buildings in the development with a common construction based on written documentation or visual evidence of construction type. Such buildings can be grouped together for sampling purposes. For example, if two buildings in the development were built at the same time by the same builder and appear to be of similar construction, all of the units in the two buildings can be grouped for sampling purposes, as can the common areas, and exterior site areas. Units can have different sizes, floor plans, and number of bedrooms and still be grouped allowing use of table 7.3 to determine the minimum number to be inspected. Similar common areas can be grouped for sampling purposes using the table to determine the minimum number to be inspected, as can similar exterior sites. (Do *not* add the number of units, common areas and exterior sites, and then use the table for the total.)

**Table 7.3 Number of Units to be Tested in Multi-family Building or Developments\***

| Number of Similar Units, Similar Common Areas, or Similar Exterior Sites | Pre-1960 or Unknown-Age Building or Development: Number of Units to Test * | 1960-1977 Building or Development: Number of Units to Test * |
|--|--|--|
| 1-10   | All  | All  |
| 11-13  | All  | 10   |
| 14   | All  | 11   |
| 15   | All  | 12   |
| 16-17  | All  | 13   |
| 18   | All  | 14   |
| 19   | All  | 15   |
| 20   | All  | 16   |
| 21-26  | 20   | 16   |
| 27   | 21   | 17   |
| 28   | 22   | 18   |
| 29   | 23   | 18   |
| 30   | 23   | 19   |
| 31   | 24   | 19   |
| 32   | 25   | 19   |
| 33-34  | 26   | 19   |
| 35   | 27   | 19   |
| 36   | 28   | 19   |
| 37   | 29   | 19   |
| 38-39  | 30   | 20   |
| 40-48  | 31   | 21   |
| 49-50  | 31   | 22   |
| 51   | 32   | 22   |
| 52-53  | 33   | 22   |
| 54   | 34   | 22   |
| 55-56  | 35   | 22   |
| 57-58  | 36   | 22   |
| 59   | 37   | 23   |
| 60-69  | 38   | 23   |
| 70-73  | 38   | 24   |
| 74-75  | 39   | 24   |
| 76-77  | 40   | 24   |

| Number of Similar Units, Similar Common Areas, or Similar Exterior Sites | Pre-1960 or Unknown-Age Building or Development: Number of Units to Test * | 1960-1977 Building or Development: Number of Units to Test * |
|--|--|--|
| 78-79  | 41   | 24   |
| 80-88  | 42   | 24   |
| 89-95  | 42   | 25   |
| 96-97  | 43   | 25   |
| 98-99  | 44   | 25   |
| 100-109  | 45   | 25   |
| 110-117  | 45   | 26   |
| 118-119  | 46   | 26   |
| 120-138  | 47   | 26   |
| 139-157  | 48   | 26   |
| 158-159  | 49   | 26   |
| 160-177  | 49   | 27   |
| 178-197  | 50   | 27   |
| 198-218  | 51   | 27   |
| 219-258  | 52   | 27   |
| 259-279  | 53   | 27   |
| 280-299  | 53   | 28   |
| 300-379  | 54   | 28   |
| 380-499  | 55   | 28   |
| 500-776  | 56   | 28   |
| 777-939  | 57   | 28   |
| 940-1004   | 57   | 29   |
| 1005-1022  | 58   | 29   |
| 1023-1032  | 59   | 29   |
| 1033-1039  | 59   | 30   |
| 1500   | 87   | 44   |
| 2000   | 116  | 58   |
| 2500   | 145  | 73   |
| 3000   | 174  | 87   |
| 3500   | 203  | 102  |
| 4000   | 232  | 116  |

\* For brevity, "Number of Units" and "Number of Units to Test" are used, but the number to test is the same for similar units, similar common areas, and similar exterior sites.