## RELATIONSHIP BETWEEN PREVALENCE OF BLLS $\geq$10 $\mu$g/dL AND PREVALENCES ABOVE OTHER CUT-OFF LEVELS

Prevalences of elevated BLLs represent distributions of BLLs in children and are a shorthand for these BLL distributions. BLLs in populations usually are log-normally distributed. That is, in any population, BLLs are distributed normally on a log-scale and are skewed toward lower BLLs on the arithmetic scale.

On the basis of these distributions, if the prevalence of BLLs that are 10 $\mu$g/dL or greater is known, it is possible to estimate the prevalences of elevated BLLs at other cut-off points. For example, the prevalence of BLLs 15 $\mu$g/dL or greater (the threshold for environmental intervention for individual children) or BLLs 20 $\mu$g/dL or greater (the threshold for medical management) can be estimated.

To arrive at these estimates, some assumptions about the variability of BLLs in the population must be made. One measure of such variability is the geometric standard deviation (GSD). For this document, we estimated that a GSD of 1.9 reflects typical variability in lead exposure in many communities in the United States. We selected it to be higher than the range of 1.67-1.79 reported in several recent studies of children living near lead smelters.[1]

Children living near smelters are likely to have less variability in BLLs than is typical since all children in those communities share a single large source of lead exposure. In contrast, we selected a value that was less than the 2.12 recently measured in a probability sample of U.S. children in NHANES III [1] because the national estimate includes variability among communities that is not relevant in any single place.

### References

1. Brody DJ, Pirkle JL, Kramer RA, et al. Blood lead levels in the U.S. population: phase 1 of the Third National Health and Nutrition Examination Survey (NHANES III, 1988 to 1991). JAMA 1994;272:277-83.

[1] The underlying population distribution is assumed to be log-normal with a geometric standard deviation (GSD) of 1.9. If lead exposure is extremely heterogeneous, this GSD will be an underestimate and, at any given geometric mean, the proportion of children with very high BLLs may be greater. If lead exposure is unusually homogenous, this GSD may be an overestimate and, at any given geometric mean, the proportion of children with very high BLLs may be lower.

**Table 1. Expected Proportions of Children with BLLs Higher Than Selected Thresholds, Given Different Prevalences of Elevated BLLs.**

| Geometric Mean | Percentage ≥ 10 μg/dL | Percentage ≥ 15 μg/dL* | Percentage ≥ 20 μg/dL† | Percentage ≥ 25 μg/dL‡ |
|---|---|---|---|---|
| 2.2 | 1% | 0.2% | 0.03% | 0.009% |
| 2.7 | 2% | 0.4% | 0.09% | 0.025% |
| 3.5 | 5% | 1.1% | 0.32% | 0.106% |
| 3.9 | 7% | 1.8% | 0.53% | 0.185% |
| 4.4 | 10% | 2.8% | 0.91% | 0.337% |
| 4.9 | 13% | 3.9% | 1.37% | 0.533% |
| 5.0 | 14% | 4.3% | 1.54% | 0.607% |
| 5.8 | 20% | 7.0% | 2.73% | 1.163% |
| 6.4 | 25% | 9.6% | 3.97% | 1.777% |
| 7.1 | 30% | 12.4% | 5.43% | 2.547% |
| 8.5 | 40% | 18.8% | 9.12% | 4.639% |

* Rounded to the nearest tenth of a percent.
† Rounded to the nearest hundredth of a percent.
‡ Rounded to the nearest thousandth of a percent.