BLOOD LEAD AND ENVIRONMENTAL MONITORING STUDY FOR RICO TOWNSITE

Phase I Data Summary Report

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September 15, 2006

EXECUTIVE SUMMARY

This report provides the chemical and statistical analysis results for the first phase of the blood lead and environmental monitoring study conducted for the town of Rico, Colorado. Blood lead and environmental samples were collected in May 2006 to support the following study objectives: 1) further characterize current blood lead levels for Rico residents and collect environmental samples to identify factors influencing exposures; and 2) understand seasonal fluctuations in blood lead levels in order to characterize the potential contribution of the soil contact exposure pathway to blood lead levels. Blood and environmental samples were collected in May 2006 and again in September 2006 to help understand seasonal changes in blood lead levels and the relative contributions of lead in various media to total body burden. A comprehensive report will be issued after analysis of the September 2006 dataset.

One hundred eighteen (118) residents participated in the first phase of the study during May 2006. Blood lead levels were measured for 117 people,[1] with blood measured in units of mass of lead per volume of blood, or micrograms (μg) per deciliter (dL). The blood lead levels for all residents range from levels below the detection limit of 1.4 μg/dL to 26 μg/dL. The median, or middle, concentration measured for all study participants is 1.9 μg/dL. The geometric mean, a statistic commonly used to represent blood lead values, was 1.8 μg/dL. The high participation rate (67 percent of eligible households) supports the overall conclusion that the measured blood lead levels are representative of permanent Rico residents at this time.

Blood lead levels measured in Rico were found to vary significantly with age and sex. Geometric mean blood lead concentrations were higher in men (0.86 μg/dL) compared to women (0.39 μg/dL), which is perhaps due to differences in potential for occupational exposures. In addition, the geometric mean blood lead level was highest for children between the ages of 0 to 6 years (3.0 μg/dL), as compared to older children (1.4 μg/dL) and adults (1.7 μg/dL). Differences in behavior, including hand-to-mouth activity and time spent on the floor, are probable contributors to higher blood lead levels measured in the youngest age group compared to older children and adults.

Two children in the 0 to 6 year age group who provided heel prick blood samples exhibited blood lead levels above 10 μg/dL, the U.S. Centers for Disease Control and Prevention (CDC) and Colorado Department of Public Health and the Environment (CDPHE) risk-management level. These children were referred to the CDPHE's Lead Poisoning Prevention Program and were retested by their personal physician. For both

[1] Blood lead could not be measured for one participant due to small sample size.

children, results of the second samples, collected via venipuncture, were below the risk-management level of 10 μg/dL.

The highest blood lead level observed during the May 2006 sampling event (26 μg/dL) was measured in an adult male who was likely in contact with lead-containing materials while working. This is the only blood lead level exceeding the CDC's and CDPHE's risk-management level of 25 μg/dL for adults. Lead concentrations in house dust and drinking water were not measured in this participant's home; however, lead levels in soil are below current remediation action levels.

The contribution of lead in dust, water, paint, and soil to blood lead levels was evaluated using mathematical models. There was no strong association in simple regression models between individual blood lead levels and concentrations of lead in yard soil or house dust. This may be due to the time of year in which sampling occurred. Repeated sampling, after the summer when participants have had the potential for more exposure to soil, and when soil is more likely to influence the composition of house dust, should elucidate this relationship.

Measurements of behavior and activity factors, including reported time spent recreating in two areas with relatively high soil lead concentrations, work history, and the number of indoor/outdoor dogs in a household, were not found to contribute significantly to blood lead levels. No relationship between blood lead and time spent recreating along the Dolores River Corridor or around the former mining area up Silver Creek Canyon were found. The lack of relationship between these activities may be due to the intentional sampling time; this spring sampling was scheduled to represent typical exposures after winter and early spring, when activities associated with exposure to soil have not yet peaked.

Reported work history was found to be associated with both gender and blood lead level. Residents working outdoors have higher potential soil exposure than those who work indoors, and men in Rico appear to be more likely to work outdoor jobs than women. The number of indoor/outdoor dogs owned per household was not found to contribute to individuals' blood lead. Dogs may transfer lead in outdoor soil to the indoors, influencing residents' exposure to lead. The soil type that dogs come in contact with (i.e., compacted, wet, or dry) is expected to vary with the time of year or, whether or not yard soil is snow-covered. The May sampling event in Rico occurred after loss of snow cover, at a time when soils were relatively dry due to limited spring rains.

Preliminary results from the first phase of this study suggest that yard remediation may have resulted in a reduction of lead concentrations not only in yard soil, but in house dust as well. As more time passes, lead concentrations in house dust from homes with previously remediated yards are likely to continue to decrease. The fall (September) sampling event will allow further evaluation of the influence of seasonality on

relationships between behavior and activity factors, indoor dust concentrations, and blood lead levels.