Health Consultation — Glynn County

Brunswick Schoolyard Soil
March 22, 2005

Introduction
The Georgia Division of Public Health (GDPH) and Glynn County Health Department (GCHD) were asked by residents to review soil sampling data to determine if concentrations of toxaphene measured in soil posed a health hazard to children who access the playgrounds at Goodyear and Burroughs-Mollette Elementary Schools, Risley Middle School, and Edo-Miller Park/Lanier Field. In response, a health consultation was prepared under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

Site Description and History
In Glynn County, Georgia, the former industrial production of the pesticide toxaphene has been associated with low-level contamination of soil throughout the Brunswick area. Soil sampling data collected during late 1980's and 1990's suggested that elevated levels of this pesticide were present in soil on public and private property, schoolyards and recreational facilities. Concentration estimates, however, varied considerably between regulatory and independently contracted studies, and although the potential sources and distribution routes for toxaphene in soils have been defined, attempts to evaluate the amount, level of exposure, or human health consequences have remained controversial and inconclusive. More recent investigations suggest that concentrations of toxaphene in soil are lower than previous estimates, and that soil data from three public schoolyards and one park showed elevated levels of non-toxaphene related pesticides (chlordane and heptachlor epoxide), polychlorinated biphenyl's (PCBs), and polycyclic aromatic hydrocarbons (PAHs).

Environmental Sampling
During the latter months of 2001 and early 2002, ninety-four composite samples were collected and field-screened for chlorinated organic chemicals by the Skidaway Institute staff at the four sites of concern. The total land area for the four sites, which includes buildings and impervious surfaces, is estimated to be approximately 900,000 sq. feet. Sample locations were determined by overlaying each site with grids laid out using 100 feet X 100 feet cells.

From each grid cell, composite samples were prepared by collecting and mixing together five shallow (0-3 inches), discrete soil samples of equal volume. Each composite sample, representing a total area of soil equivalent to 10,000 ft, was then screened using enzyme-linked immunosorbent assay (ELISA) for the presence of toxaphene. Composite samples that field-screened "ELISA positive" were shipped to and analyzed at the Skidaway Institute of Oceanography laboratory by other procedures using Best Available Technology (BAT).

Laboratory analysis suggested that although the ELISA procedure was non-specific in screening for toxaphene, it did prove to be a good indicator for detecting the presence of several unrelated chlorinated pesticides, polyclyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), as well as the intended target contaminant, toxaphene.

Results
Toxaphene was detected, but below comparison values (CVs) in 38% of samples collected at Burroughs-Mollette Elementary School, 16% of samples collected at Risley Middle School, and 67% of samples from Edo-Miller Park, this pesticide could not be identified in any samples collected at Goodyear Elementary School. Toxaphene was used regularly throughout Brunswick for pest control for many years, and these trace level residues may have originated from past applications. Soil manipulation and site grade renovations at Goodyear Elementary School during reconstruction, included the addition of fill dirt from an outside source. These activities may explain the absence of toxaphene at this site.

Chlordane, cis-nonachlor, trans-nonachlor, fluoranthene, pyrene, chrysene, total PCBs and total PAHs were all found in the majority (equal to or greater than 50%) of samples taken at all four sites.

Benzo(a)pyrene (BAP) and total polycyclic aromatic hydrocarbons (PAHs) were found in the composite soil samples at levels close to or exceeding CVs in this study. PAHs, including BAP, are a group of over 100

different chemicals that are formed during the incomplete burning of coal, petroleum products, garbage, or other organic substances like tobacco. The U.S. Department of Health and Human Services has determined that some PAHs, including BAP, may reasonably be expected to cause cancer.

Levels of BAP close to or above one CV were reported in four soil samples obtained from each of the three school sites (two elevated levels were found at Goodyear). These samples were found to spatially represent BAP impacted soil ranging from approximately 10,000 sq. feet at both Burroughs-Mollette and Risley Schools, to 30,000 sq. feet at Goodyear School. No BAP levels exceeding a CV were found at Edo-Miller Park.

There are no CVs for total PAHs. BAP is the only PAH found with a CV that was exceeded. No sample contained greater than 9.7% BAP. Total PAHs were found at levels exceeding a regulatory level at two sites, spatially representing areas at Goodyear (150,000 sq. feet.) and Risley (20,000 sq. feet).

Conclusions

The GDPH and GCHD have determined that the Goodyear Elementary School is an ***indeterminate public health hazard*** because there are insufficient data to determine whether the site has had an adverse impact on human health. In order to protect students and workers, confirmation soil sampling, analyses and additional evaluation are needed to determine the level of contaminants present and extent of soil affected. The limited data available do not indicate that humans are being or have been exposed to levels of contamination that would be expected to cause adverse health effects.

The GDPH and GCHD have determined that Burroughs-Mollette Elementary, Risley Middle School and Edo-Miller Park are ***no apparent public health hazard*** because human exposures to contaminated soil that may be occurring, or have occurred in the past, are at levels below those considered to be a health hazard for children, employees or other workers.

Recommendations

- Additional limited evaluation of surface and subsurface soil at Goodyear Elementary School should be conducted to determine the vertical and horizontal extent of contamination.
- Until the results from additional soil analyses have been evaluated, the following precautionary measures should be put into place at Goodyear Elementary School: (1) maintain substantial ground cover to minimize exposures to children and workers, and (2) Implement a Health and Safety Plan to protect on-site workers performing activities related to excavation, lawn maintenance, and utility repairs.