Appendix C

Analysis of the Volatilization Exposure Pathway Summary of Naphthalene Risks from Inhaling Ambient Air VOCs

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Inhalation of compounds volatilized from soil into ambient air is a potential exposure pathway for industrial workers at the St. Maries Creosote Site. Semivolatile organic compounds (SVOCs) are the primary COI in creosote, and naphthalene is the most volatile of the SVOCs. As such, the chemical of concern for this pathway is naphthalene. The maximum naphthalene concentration reported for Site soil is 12,000 mg/kg (riverbank sample). Concentrations in soils (all depths) from the upland area range from less than 0.3 mg/kg to 2,830 mg/kg. To quantitatively evaluate this pathway, a chemical-specific volatilization factor (VF) from surface soil to ambient air must be calculated. As presented in Table C-1, the VF calculation takes into account a dispersion factor (Q/C), which is specific for the ambient conditions and source dimensions of the Site.

At this site, the naphthalene concentrations were found to be greater than the saturation limit in soil (Csat) for naphthalene, which is calculated to be 375 mg/kg. According to USEPA's 1996 *Soil Screening Guidance: User's Guide*, "Csat values represent chemical-physical limits in soil. Since the Csat represents the concentration at which soil pore air is saturated with a contaminant, volatile emissions reach their maximum at Csat. In other words, at Csat concentrations, the emission flux from soil to air for a chemical reaches a plateau. Volatile emissions will not increase above this level, no matter how much more chemical is added to the soil (USEPA, 1996)". Based on this concept, concentrations above the Csat (375 mg/kg) will not lead to increased vapor emissions to ambient air above what would be expected at Csat concentrations.

As a conservative measure, inhalation risks for naphthalene were calculated using the soil saturation concentration of 375 mg/kg. The calculation assumes a 200- by 200-foot source area is fully saturated with naphthalene. Site data and observations indicate that soil concentrations are much lower over most of the area. Site workers generally spend 8 hours per day working across the whole facility. The workers spend approximately 0.02 percent of their time (4 hours per month; reasonable maximum estimate) in the 200- by 200-foot impacted area. As the Site lies in a floodplain, more concentrated use of the Site, or construction of buildings is unlikely. Given these conservative assumptions, the resulting noncancer risk for an outdoor industrial worker who is exposed to affected soil at the site for 8 hours per day is 0.016, which is less than the acceptable target hazard quotient (HQ) of 1.0. Therefore, it is believed that this exposure pathway does not pose a risk for the outdoor industrial worker.

Reference

USEPA, 1996. *Soil Screening Guidance: User's Guide.* EPA/540/R-96/018. United States Enviornmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C. April.