

Center for Environmental & Human Toxicology

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Ligia Mora-Applegate Bureau of Waste Cleanup Florida Department of Environmental Protection 2600 Blair Stone Road Tallahassee, FL 32399-2400

Re: Dioxin and benzo(a)pyrene in off-site sediment for the Koppers, Inc. Superfund site

Dear Ms. Mora-Applegate:

At your request we have reviewed the data in the Alachua County Environmental Protection Department (ACEPD) study *Sediment Quality in Springstead and Hogtown Creeks Near the Cabot-Koppers Superfund Site* (May 12, 2009) and the analytical report for dioxin in sediment samples collected on November 19, 2009 (dated January 12, 2010). We have also reviewed a sediment sample summary report submitted to the FDEP by the ACEPD (March 1, 2010), which includes pictures and descriptions of the sampling sites. Data from all of these documents were utilized for the purposes of this review.

According to U.S. EPA Region 4 guidance, submerged sediments are not considered to be a direct exposure risk for humans. This is because most of the direct exposure risk to solid material such as soil or sediment would be expected to occur as a result of adherence to skin and subsequent incidental ingestion and dermal absorption. Material that is perpetually underwater (i.e., submerged sediment) would be largely washed off during contact and consequently not a source of substantial exposure. This is not the case for exposed sediment that is located on the banks of the creeks or on sand bars and creek bottoms that are exposed all or part of the year. Intermittently exposed sediments are available for direct human contact and are consequently treated in the same way as contaminated soil for human health risk assessment purposes. For evaluation of ecological risks, both submerged sediments and intermittently exposed areas are potentially relevant.

Sediment samples in this study were taken during the dry season when water levels were low. The sediment sample summary report (ACEPD, March 1, 2010) indicates that some of the samples represent submerged sediments while other samples were taken from exposed sand bars or banks of the creek. For reasons explained above, the location of the sample is important in terms of risk implications. Sample locations H4, HC, SC, SD, SG, SH1, SI1, and SS5 were taken from sand bars that remain above the water level during normal flow conditions and are evaluated as soil for human health risk. Given the proximity of the creeks to residential yards, FDEP direct contact residential soil cleanup target levels (SCTLs) are a logical basis for initial

comparison. Samples SGS (8.6 ng/kg), SDS (12.0 ng/kg), SH1 (41 ng/kg), and SI1 (11 ng/kg) exceed the residential SCTL for dioxin (7 ng/kg) 0-6 inches below land surface (bls). In the deeper sediment interval (6-24 inches bls), samples SGD (20 ng/kg) and SDD (8.2 ng/kg) exceed the dioxin residential SCTL. Additionally, samples SS5S (0.77 mg/kg) and H4S (1.66 mg/kg) exceed the FDEP residential SCTL for benzo(a)pyrene toxic equivalent (BaP TEQ) concentrations (0.1 mg/kg) in shallow soil. Samples SS5D (0.13 mg/kg), SCD (1.09 mg/kg), SDD (0.74 mg/kg), and H4D (2.27 mg/kg) all exceed the SCTL for BaP TEQs in the 6-24 inch bls interval.

It could be argued that the exposure frequency associated with the default residential scenario (350 days per year) is not applicable for creek banks and sand bars; steepness of creek banks in many locations hinders access to the creeks and would be expected to reduce frequency of exposure. With lesser contact, SCTLs needed to achieve target risks would be higher. If known, the fraction of time contaminated areas are submerged by higher water levels could also be taken into account in adjusting dioxin and BaP SCTLs on a site-specific basis. Given the presence of two carcinogens, potential additive effects of both would need to be considered in developing alternative SCTLs, as specified in Chapter 62-780, F.A.C. Any use of a site-specific alternative SCTLs necessitates implementation of a voluntary institutional control to insure that factors that limit exposure remain in place (per Chapter 62-780, F.A.C.) We note that crafting effective institutional control language and gaining acceptance by residents along the creeks may be difficult. Also, alternative SCTLs would not apply to areas other than the creek bank and exposed bottom areas. Default residential criteria would apply to remaining areas of residential yards.

From an ecological perspective, dioxin in aquatic environments is typically of greatest concern for fish and piscivorous birds and mammals. Benthic invertebrates are essentially resistant to the effects of dioxin. During a site visit on March 25, 2010 we observed fish from one to six inches long in the sections of Springstead and Hogtown Creeks where dioxin contamination has been found in submerged sediments (samples SS2, S10, and SA). We also identified raccoon and wading bird tracks along the banks and sandbars. Anecdotal reports from residents included sightings of otter, egrets, fox, and owls in this area. The presence of piscivorous mammals and a sustainable fish population along the creeks supports the use of the US EPA ecological dioxin screening level of 2.5 ng/kg (US EPA, 1993). All of the creek samples (excluding upstream samples) exceeded this screening level. Therefore, further investigation of potential ecological impacts from dioxin in the creeks is warranted.

The concentrations of total PAHs in Springstead and Hogtown Creeks are of concern with regard to benthic organisms. Samples SS2D (25 mg/kg), S10D (3.3 mg/kg), S9D (24 mg/kg), HBD (6.5 mg/kg), HAD (32 mg/kg), and SAD (32 mg/kg) exceed the toxic effect concentration (TEC) of 1.6 mg/kg for total polynuclear aromatic hydrocarbons (PAHs) in the 6-24 inch bls interval. Although, the 6-24 inch depth interval is not usually of concern for benthic organisms, storm events could cause substantial sediment shifting and expose previously covered layers of sediment. Consequently, sediment in the 6-24 inch bls interval could be uncovered and should also be considered a potential concern for exposure.

All of the sampling locations with BaP TEQ exceedances (human health criterion) or total PAH exceedances (ecological health criterion) are co-located with tarry deposits and are proposed for removal. We support the proposal to remove all tar-affected

sediment from Springstead and Hogtown Creeks with confirmatory sampling. PAH contamination has both ecological and human health risk implications, and delineation of contamination should be to the lower of ecological and human health soil and sediment criteria. Given that PAHs and dioxin contamination in the creeks are not consistently co-located, this remedial effort cannot be assumed to address the issue of dioxin contamination.

Please let us know if you have any questions regarding this review.

Sincerely,

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Leah D. Stuchal, Ph.D.

Stephen M. Roberts, Ph.D.

Reference:

US EPA (1993) Interim Report on Data and Methods for Assessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin Risks to Aquatic Life and Associated Wildlife. Office of Research and Development. Duluth, MN.