

12.06-10/9/1996-00 400

MEMORANDUM

CH2M HILL

Soil Remediation - PAH issues

TO: Jim Harris/Lantdiv
COPIES: Stewart Barnes
FROM: Doug Dronfield
DATE: October 9, 1996

Jim,

I have attached a one-page table that outlines action levels for PAHs in soil for the industrial setting. The purpose of this table is to provide for you some guidelines for the return of soil to the excavation after treatment in the biopile. The primary concern for PAHs should be the future potential exposure of workers to soil that would now be at the surface. The table provides EPA's guidelines for exposure for this scenario. It is similar to the assumptions that we used in the CMS, but not exactly. The EPA soil exposure guidelines have recently undergone some more revisions. The net change in concentrations calculated using both methods is small based on cross checks for a couple of compounds.

I don't think there should be any concern about what the concentrations of PAHs should be for placement back into the excavation based on the leaching to groundwater pathway. We could model this to come up with some theoretical action levels. However, the real world has shown us that the existing concentrations have not caused any significant PAH contamination in the groundwater. There is no reason to expect PAH concentrations in groundwater to rise after the soil is treated and PAHs soil concentrations are lowered. Likewise, I see no significant added benefit of confirmatory sampling of soil left in the excavation for PAHs because it doesn't seem to matter what the concentrations are in the soil, it hasn't leached to the groundwater.

I would think that the only soil sampling you would need to do is of the 0-6 inches after the soil has been placed to confirm there is no risk. Sampling the pile before it goes back in the excavation may not be accurate as to the soil actually on the surface. Another option I would think may be to place a 6-inch layer of topsoil on top of the returned biopile soils. The surface exposure risk to the returned biopile soils is also applicable to the other compounds of concern such as benzene, toluene, ethylbenzene, and xylene. These RBC numbers from the EPA guidance (benzene - 200 mg/kg; toluene - 410,000 mg/kg; ethylbenzene - 200,000 mg/kg; xylene - 1,000,000) are above the maximum concentrations that we have found in the soil at the site.

**Risk-Based Concentrations
For Industrial Exposure to Surface Soil
Containing Polycyclic Aromatic Hydrocarbons**

Oceana Site 15

The risk-based concentrations (RBCs) in the following table are from U.S. EPA Region III RBC Table provided by the Technical and Program Support Branch in Philadelphia, PA, and found online on the World Wide Web at <http://www.epa.gov/>.

RBCs can be used as a screening tool for establishing preliminary remediation goals (PRGs); although conservatively based, they do not consider specific site conditions or the possibility of risks from multiple constituents or multiple media.

Preliminary Remediation Goals (PRGs)

Soil Ingestion for an Industrial Setting

Polycyclic Aromatic Hydrocarbon (PAH)	PRG (mg/kg)
Acenaphthene	120,000
Acenaphthylene	NA
Anthracene	610,000
Benzo(a)anthracene	7.8
Benzo(b)fluoranthene	7.8
Benzo(k)fluoranthene	78
Benzo(g,h,i)perylene	NA
Benzo(a)pyrene	0.78
Chrysene	780
Dibenzo(a,h)anthracene	0.78
Fluoranthene	82,000
Fluorene	82,000
Indeno(1,2,3-cd)pyrene	7.8
1-Methylnaphthalene	82,000
2-Methylnaphthalene	82,000
Naphthalene	82,000
Phenanthrene	NA
Pyrene	61,000

The list of PAHs are those analyzed by SW-846 Method 8080.

NA - Not applicable as no toxicity values are available to calculate risks.

The PRG for naphthalene was used as a surrogate for 1- and 2-methylnaphthalene.

The PRGs above are based on an industrial or commercial exposure to surface soil. Exposure assumptions are for a worker who weighs 70 kg and works on the site 250 days a year for 25 years. He ingests 100 mg of soil per day, and 50% is from the contaminated area.