



MO Risk-Based Corrective Action for Petroleum Storage Tank Sites Sampling for Polynuclear Aromatic Hydrocarbons

What are Polynuclear Aromatic Hydrocarbons?

Polynuclear aromatic hydrocarbons are hydrocarbon compounds with multiple benzene rings. Polynuclear aromatic hydrocarbons are typical components of asphalts, fuels, oils and greases. They are also called Polycyclic Aromatic Hydrocarbons. Polynuclear aromatic hydrocarbons are associated with heavy petroleum, including diesel fuel, jet fuel, kerosene, heavy fuel oils and waste oil. The analytical standards used under the Missouri Risk-Based Corrective Action (MRBCA) process report these types of petroleum as either Diesel Range Organics or Oil Range Organics .

What are the MRBCA provisions for sampling polynuclear aromatic hydrocarbons in surficial soil?

Surficial soil is soil from the surface of the ground to a depth of three feet. Risks associated with polynuclear aromatic hydrocarbons are the greatest through ingestion and dermal contact exposure routes. All surficial soil samples that contain total petroleum hydrocarbons with Diesel Range Organics or Oil Range Organics at a concentration above laboratory detection limits or the required reporting limits shown in Table 5-3 of the MRBCA guidance, whichever are lower, must be analyzed for the polynuclear aromatic hydrocarbons listed in Table 5-1 of the MRBCA guidance.

What are the MRBCA provisions for sampling polynuclear aromatic hydrocarbons in subsurface soil?

Subsurface soil is soil in the zone between a depth of three feet and the top of groundwater. Due to its low vapor pressure, polynuclear aromatic hydrocarbons do not readily migrate in a vapor form. Therefore, the vapors to indoor air pathway is of negligible concern in evaluating the risks posed by polynuclear aromatic hydrocarbons. Except for naphthalene, the Department of Natural Resources does not require that every subsurface soil sample containing detectable total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics be analyzed for the polynuclear aromatic hydrocarbons listed in Table 5-1 of the MRBCA guidance. Rather, samples should be analyzed for polynuclear aromatic hydrocarbons as follows:

- Only samples containing total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics at concentrations above laboratory detection limits or the required reporting limits, whichever are lower, need be analyzed for polynuclear aromatic hydrocarbons.



- A minimum of 25 percent, or two samples, whichever is greater, of the total number of subsurface soil samples found containing total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics must be analyzed for the polynuclear aromatic hydrocarbons listed in Table 5-1 of the MRBCA guidance.
- The samples to be analyzed for polynuclear aromatic hydrocarbons shall be the 25 percent or two samples, whichever is greater, that contain the highest concentrations of total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics. However, only one sample from each boring shall be analyzed for polynuclear aromatic hydrocarbons. If the samples with the highest concentrations of total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics came from the same boring, the sample with the highest total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics should be analyzed for polynuclear aromatic hydrocarbons. The rest of the samples should come from other borings in which total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics was detected.
- In certain cases where pathways associated with the construction worker are of concern, the department may require additional subsurface soil samples be analyzed for polynuclear aromatic hydrocarbons.
- These provisions do not pertain to naphthalene due to its unique physical and chemical properties. All subsurface soil samples shall be analyzed for naphthalene.

What are the MRBCA provisions for sampling polynuclear aromatic hydrocarbons in groundwater?

Polynuclear aromatic hydrocarbons generally do not readily partition into groundwater in significant concentrations because polynuclear aromatic hydrocarbons tend to have very low water solubilities and a tendency to adsorb to soil. Therefore, with the exception of naphthalene, the department does not require all groundwater samples having detectable total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics be analyzed for the polynuclear aromatic hydrocarbons listed in Table 5-1 of the MRBCA guidance. Rather, groundwater samples shall be analyzed for polynuclear aromatic hydrocarbons in accordance with the following provisions:

- Only those samples having concentrations of total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics above the laboratory detection limits or the required reporting limits listed in Table 5-3 of the MRBCA guidance, whichever are lower, need be analyzed for polynuclear aromatic hydrocarbons.
- A minimum of 25 percent or two samples, whichever is greater, of the groundwater samples found to contain detectable total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics shall be analyzed for polynuclear aromatic hydrocarbons.
- Samples to be analyzed for polynuclear aromatic hydrocarbons shall be the 25 percent or two samples, whichever is greater, that contain the highest concentrations of total petroleum hydrocarbons-Diesel Range Organics or total petroleum hydrocarbons-Oil Range Organics.
- In certain cases where the Department of Natural Resources finds or expects the solubility of polynuclear aromatic hydrocarbons to be increased due to the presence of other contaminants in soil or groundwater, the department may require additional water samples be analyzed for polynuclear aromatic hydrocarbons.

- Due to its unique chemical and physical properties, the above provisions do not apply to naphthalene; all water samples shall be analyzed for naphthalene.

For more information

Missouri Department of Natural Resources
Hazardous Waste Program

Tanks Section

P.O. Box 176

Jefferson City, MO 65102 0176

1-800-361 4827 or (573) 751-6822 office

(573) 526-8922 fax

www.dnr.mo.gov/env/hwp/tanks/tanks.htm

www.dnr.mo.gov/env/hwp/index.html