INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.

Mitchell E. Daniels Jr.
Governor

Thomas W. Easterly
Commissioner

100 North Senate Avenue
Indianapolis, Indiana 46204
(317) 232-8603
Toll Free (800) 451-6027
www.idem.IN.gov

July 16, 2009

Announcement of Updates to TPH Remediation Goals and Procedures

In response to difficulties staff and consultants were encountering in determining the nature and extent of TPH ERO contamination in the ground water, a workgroup was formed among representatives of the Midwest States Environmental Consultants Association (MSECA) and IDEM staff to recommend a solution. The Workgroup met four times, beginning on March 11th, 2009 and made the following recommendations. It is anticipated that these modifications should address 90% of the problem sites that have been unable to achieve closure due to ERO in ground water exceeding the default closure levels. More meetings of the workgroup are planned to discuss additional issues related to TPH, but we didn't want to delay releasing these changes.

1. New Surrogates for Three TPH Aromatic Fractions in the TPH Calculator
The default and nondefault health-based TPH closure levels are determined using a calculator which assigns toxicological surrogates to represent the toxicity of each of 12 fractions. Naphthalene was used as the toxicological surrogate for three of the aromatic fractions, EC > 8 – 10, EC> 10 – 12, and EC> 12 – 16, in the TPH calculator. At the suggestion of the workgroup, IDEM has researched more appropriate toxicological surrogates for those fractions and recommended the following:

- Aromatic EC>8 – 10: cumene
  - RfDo 0.1 mg/kg-day; RfDi 0.1 mg/kg-day (RfC 0.4 mg/m^3)
- Aromatic EC>10 – 12: 1,1 biphenyl
  - RfDo 0.05 mg/kg-day; RfDi 0.06 mg/kg-day (RfC 0.2 mg/m^3)
- Aromatic EC>12 – 16: 1,1 biphenyl
  - RfDo 0.05 mg/kg-day; RfDi 0.06 mg/kg-day (RfC 0.2 mg/m^3)

These new closure levels are based upon the current 2006 RISC algorithms and toxicity values, but substituted the new surrogate compounds for naphthalene. As part of the RISC update, these algorithms and toxicity values are likely to change. However, these new TPH closure levels can be implemented, immediately. These changes will be included in an update of the TPH Fractionation Tool that will be posted soon in the RISC Toolbox at: http://www.in.gov/idem/4205.htm.

The resultant impact upon the TPH closure levels using default parameters is as follows:

Product	Residential Direct Contact (mg/kg)	Residential Migration to Ground Water (mg/kg)	Residential Ground Water (mg/l)	Industrial Direct Contact (mg/kg)	Industrial Migration to Ground Water (mg/kg)	Industrial Ground Water (mg/l)
Gasoline Range Organics	**3100**	**120**	**1.1**	**4300**	**1500**	**14**
Diesel Range Organics	**3100**	**230**	**0.26**	**5800**	**2300**	**2.5**
High End Hydrocarbon Oils	**3100**	**230**	**0.26**	**5800**	**2300**	**2.5**

Consistent with RISC, the default closure levels are the lower of the Direct Contact or the Migration to Ground Water closure levels.

The fuel specific maximum allowable concentrations have been dropped, but the maximum allowable TPH concentration in soil of 10,000 mg/kg remains in effect.

2. Limit Diesel Analysis to the 8015 DRO Range, Rather Than ERO Range

While the TPH default and nondefault closure levels are determined using the VPH/EPH fractionation method, determining compliance with the closure levels is done using SW 846-8015. The Workgroup questioned the appropriateness of using 8015 ERO (C8 – C34) to characterize diesel and similar mid-range products that are only composed of compounds in the C8 – C28 range. It was agreed that when the petroleum fuel is diesel or a similar mid-range product, the analysis should be limited to the DRO range, C8 – C28. For heavier products (*i.e.* high-end hydrocarbon oils), the range C8 - C34 would still be necessary. The default closure level for the heavier products will continue to be the same as the mid-range products.

3. Weight of Evidence Approach for Closure

A common concern has been that at some petroleum sites, all of the COCs in the ground water and soil are at, or below, their respective closure levels, but TPH DRO is still being detected above the residential closure level in the ground water. Stepping out has failed to find the end of the "TPH plume" and is preventing closure at sites that may not be posing any serious threat. It was suggested that a weight of evidence approach could be used at such sites. The following outline is suggested for such an approach:

- If TPH DRO is the only COC > RCL in ground water (but < ICL); and
- If TPH DRO in soil is < residential migration to ground water; and
- If ground water samples are from a properly constructed and developed monitoring well using low flow sampling; then
- Conclusion: The weight of evidence approach may indicate that the TPH DRO is not an issue at the site and it can close.

4. Naturally Occurring TPH from Shale and Crude Oil in Soils

OLQ geologists evaluated the potential for shale to contribute naturally occurring TPH in soil and concluded that in certain regions of the state, TPH contributions from shale were likely. Crude oil has occasionally been encountered in soil samples from some areas of the state, also. This information will be posted on the OLQ web site as a geology guidance document. If naturally occurring TPH is suspected at a site, consult with the site's project manager and investigate it as a background issue.