

## Risk Assessment Approach for Calculating cPAH Non-Industrial Direct Contact RCLs - Wis. Admin. Code § NR 722.11 (1)

### Purpose

The purpose of this document is to introduce and explain a modified soil RCL spreadsheet that meets the requirements of Wis. Admin. Code § NR 722.11 (1) for calculating alternative PAH direct contact residual contaminant levels (RCLs).

### Related Documents

- [RR-890 – Soil Residual Contaminant Level Determinations Using the U.S. EPA Regional Screening Level Web Calculator](#)
- [RR-087 - Calculating Soil RCLs for PAHs - Wis. Admin. Code § NR 722.11 \(1\)](#)
- [4400-237 – Technical Assistance and Environmental Liability Clarification Request form](#)

### Other Resources

Questions regarding this document should be directed to Paul Grittner at [paul.grittner@wisconsin.gov](mailto:paul.grittner@wisconsin.gov) or (608)-266-0941.

### New alternative for determining Soil Residual Contaminant Levels for PAHS

A modified soil residual contaminant level (RCL) spreadsheet was developed for use in meeting the requirements of Wis. Admin. Code § NR 722.11 (1) for calculating alternative, non-industrial direct contact RCLs for select carcinogenic polycyclic aromatic hydrocarbons (cPAHs). The modified soil RCL spreadsheet may be used to attain compliance when the applicable cPAH direct contact RCLs in Wis. Admin. Code § NR 720 is not practicable. The spreadsheet changes how non-industrial direct contact RCLs for seven cPAHs are assessed. The spreadsheet evaluates cPAH compounds on a cumulative basis only, rather than on an individual compound basis and a cumulative basis. The changes affect the direct contact RCLs for cPAHs, but not the groundwater protective RCLs. The modified spreadsheet incorporates the cPAH risk reassessment completed by the Wisconsin Department of Health Services (DHS).

### DHS Reassessment

At the request of the DNR, the DHS completed a reassessment of risk associated with cPAHs and an evaluation of the methods used by the DNR to determine direct contact RCLs for cPAHs. Numerous factors were evaluated and key criteria to be considered were identified as follows:

- The cPAHs are found as a mixture of many PAH compounds; they are not found as independent compounds.
- The cPAH compounds have similar health effects with respect to human toxicology and thus can be effectively evaluated as a group.

Based on the reassessment findings, DHS concluded that assessment of cPAHs exclusively on a cumulative basis is appropriate. Assessment on an individual compound basis is not required to ensure protectiveness.

### PAHs Explained

Polycyclic aromatic hydrocarbons (PAHs) refers to a large class of organic compounds that contain only carbon and hydrogen and are comprised of two or more fused aromatic rings. Most PAHs are high-melting, high-boiling point compounds, predominantly generated from the incomplete combustion or pyrolysis of organic matter like coal.

The number of compounds comprising the PAH class is unknown, although hundreds of individual PAHs may be present as components of complex mixtures. Typical soil-PAH lab analyses report the concentrations for only 18 PAHs even though potentially hundreds of PAHs exist. Cumulative assessment using the modified RCL spreadsheet addresses the following seven cPAHs:

- Benzo[a]pyrene;
- Benz[a]anthracene;
- Benzo[b]fluoranthene;

- Benzo[k]fluoranthene;
- Chrysene;
- Dibenz[a,h]anthracene; and
- Indeno[1,2,3-cd]pyrene.

The seven compounds have risk levels assessed using the “Relative Potency Factor (RPF) approach” that compares toxicity relative to that of Benzo[a]pyrene (BaP).

Naphthalene and 1-methylnaphthalene are also cPAHs included in the 18 PAHs that are typically reported; however, their cancer endpoint toxicological factors are derived independent of BaP. Although carcinogenic, these compounds do not typically exceed the “not practicable” criteria required by Wis. Admin. Code § NR 722.11(1)(b). Changes to the assessment method for Naphthalene and 1-methylnaphthalene are not included in the modified RCL spreadsheet. These compounds will continue to be assessed on both an individual and cumulative basis.

## **Remediation and Redevelopment Program’s Soil RCL Spreadsheet**

The standard spreadsheet from the Remediation and Redevelopment (RR) Program contains the Wis. Adm. Code § NR 720 soil RCL numerical soil cleanup standards. Under Wis. Admin. Code § NR 720, an individual compound’s soil RCL for direct contact may not exceed a target cancer risk of  $1 \times 10^{-6}$  (1:1-million) and the cumulative effect of all compounds in the soil may not exceed a target cancer risk of  $1 \times 10^{-5}$  (1:100,000).

In the modified spreadsheet, the soil data for the seven select cPAHs with RPFs will not be assessed for individual exceedances, but will be exclusively assessed for only the cumulative risk exceedance. Using this modified approach, the cumulative effect of the seven cPAHs will not exceed a target cancer risk of  $5 \times 10^{-6}$  (1:200,000). The cumulative risk allowed when using this modified approach is less than the maximum cumulative risk allowed in Wis. Admin. Code § NR 720 when both individual and cumulative risks are assessed.

## **New Calculator for New Approach - What Consultants Need to Know**

The alternative method of determining RCLs for PAHs is a risk-based approach and is an option under Wis. Admin. Code § NR 722.11. Use of the modified calculator requires that the conditions of Wis. Admin. Code § NR 722.11(1)(b) and (2) are met.

- To comply with Wis. Admin. Code § NR 722.11, consultants must request approval to use the § NR 722.11(1)(b) risk assessment option, indicating that reaching Wis. Admin. Code § NR 720 direct contact RCLs is not practicable and the modified RCL calculator will be used to calculate risk based standards using a cumulative assessment for cPAHs. The request to use this option may be provided as a separate submittal or may be incorporated into one of the documents listed in Appendix 1 of “Calculating Soil RCLs for PAHs – Wis. Admin. § NR 722.11(1)” (RR-087). RR-087 includes further information on the procedures to request and submit the request. The responsible party may request the use of a risk assessment. The DNR is to provide standard exposure assumption if the use is approved, and must approve, modify, or deny the submitted risk assessment per Wis. Admin. Code § NR 722.11(2). Notice of the use of the modified calculator should be clearly indicated on any data table showing results compared to standards, including Wis. Admin. Code § NR 716 site investigation reports, Wis. Admin. Code § NR 722 remedial action options reports, and in Wis. Admin. Code § NR 726 closure documents.
- Use of the cumulative assessment requires that all analyzed carcinogenic compounds be included in the RCL spreadsheet. This includes the seven cPAHs, other cPAH compounds and any non PAH compounds for comparison to the maximum allowable cumulative risk.
- The method detection limit (MDL) for all compounds analyzed but not reported at concentrations greater than the MDL must be included on the spreadsheet as the reported quantity of the compound. The MDL is included in the assessment as the probable concentration of the compound for the purpose of the cumulative RCL calculation.

## Summary of Changes

When attaining compliance with the applicable cPAH non-industrial direct contact RCLs in Wis. Admin. Code § NR 720 is not practicable, a request can be submitted to the DNR to use the modified soil RCL spreadsheet to calculate alternate RCLs. The modified spreadsheet provides a method to comply with Wis. Admin. Code § NR 722.11 requirements for developing alternate soil standards. The modified spreadsheet assesses seven cPAHs exclusively for cumulative risk. Assessment of individual compound specific risk for the seven cPAHs is not required when using the modified spreadsheet.

Aside from the seven cPAHs, there will be no change in the assessment method for other cPAHs (e.g. naphthalene and 1-methylnaphthalene). As before, they will continue to be assessed on both an individual and cumulative basis.

The proposed change regarding cPAHs will affect the non- industrial direct contact RCLs, but not the industrial direct contact or groundwater-protective RCLs.

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