

RR-079

Calculating Soil RCLs for PAHs
Wis. Admin Code § NR 722.11 (1)

Wisconsin Department of Natural Resources
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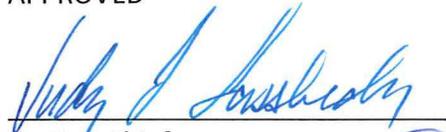
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Comments on this document should be sent to Paul Grittner at paul.grittner@wisconsin.gov; 608-266-0941

This guidance document introduces the modified residual contaminant level (RCL) spreadsheet that allows an alternative method for calculating non-industrial direct contact RCLs for seven carcinogenic polycyclic aromatic hydrocarbons (cPAHs). The modified spreadsheet will assess these cPAHs based exclusively on cumulative risk and will not assess their individual compound specific risk. Use of this spreadsheet will comply with the requirements of Wis. Admin. Code § NR 722.11 for developing alternate standards when meeting the RCLs in Wis. Admin. Code § NR 720 is not practicable. The modified spreadsheet is based on the Wisconsin Department of Health Services' reassessment of the risk posed by cPAHs.

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APPROVED


Section Chief

5/8/17
Date


Darsi Foss, Director
Bureau for Remediation and Redevelopment

5/8/17
Date

Calculating Soil RCLs for PAHs

Wis. Admin Code § NR 722.11 (1)

Purpose

The purpose of this guidance 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).

New alternative for determining Soil RCLs for PAHs

A modified soil 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 residual contaminant levels (RCLs) for select carcinogenic polycyclic aromatic hydrocarbons (cPAHs). The modified soil RCL spreadsheet can 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, 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 seven cPAHs including:

- 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 practicability measure required by Wis. Admin. Code § NR 722.11. 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 is constrained not to exceed a target cancer risk of 1×10^{-6} (1:1-million) and the cumulative effect of all compounds in the soil is constrained not to exceed a target cancer risk of 1×10^{-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 be constrained to not exceed a target cancer risk of 5×10^{-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 regulated under Wis. Admin. Code § NR 722.11. Use of the modified calculator includes new requirements to meet the Wis. Admin. Code § NR 722.11 risk approach constraints.

- To comply with Wis. Admin. Code § NR 722.11, consultants must indicate that reaching Wis. Admin. Code § NR 720 direct contact RCLs is not practicable and must indicate that the modified RCL calculator was used to calculate risk based standards using a cumulative assessment for cPAHs. 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 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, the modified soil RCL spreadsheet can be used to calculate alternate RCLs. The modified spreadsheet provides an approved method to comply with Wis. Admin. Code § NR 722.11 requirements for developing alternate standards. The modified spreadsheet assesses seven cPAHs exclusively for cumulative risk. Assessment of individual compound specific risk for the seven cPAHs is not required.

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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