Amendments to the Remediation Standards

June 9, 2021

Christina Page, Co-Moderator
Training Committee, Chair

Lynne Mitchell, Co-Moderator
Training Committee Manager

Continuing Education Credits (CECs)

SRP Licensing Board **has not yet approved**

1 Regulatory CEC

4 Technical CECs

for this Training Class

<u>Attendance Requirements</u>:

- **Webinar participants**: must be logged-in for the entire session and answer 3 out of 4 poll questions (randomly inserted in the presentation)

CECs: What's the Process?

Since the SRPL Board HAS NOT approved CECs for the course:

- DEP compiles a list of "webinar" participants eligible for CECs and provides the list to the LSRPA
- LSRPA will email eligible participants a "Link" to an LSRPA webpage with certificate access instructions
- Certificates are issued by the LSRPA after paying a *$25 processing fee*

CECs: What's the Process?

Since the SRPL Board Has <u>NOT</u> approved CECs for the course…

The certificate process will occur **<u>AFTER</u>** the course has been approved by the SRPL Board

Test Your Knowledge

Why are you here today?

A. I’m not sure

B. It’s too hot outside

C. Remediation Standards Training

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Question and Answer Segments

- Questions will be read aloud by the moderator as time permits
- Please hold your questions until a presentation is complete
- Any questions are not addressed during the presentation, will be answered via email

Chat Function

- Please use the chat to advise the Department of technical issues with the presentation
- Please do not use the chat function to comment on presentations or to answer other attendee's questions

Remember!

Please fill out the Course Evaluation here:

https://www.surveymonkey.com/r/N3K7T53

Stay logged in all day

Login in with only one device

Amendments to the Remediation Standards Training

June 9, 2021

NJ Licensed Site Remediation Professionals Association

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Upcoming LSRPA Courses & Events

- **June 10, 2021 – Aspiring Professionals Series: Borehole Geophysical Logging**

  Jim Peterson, PG, LSRP, Princeton Geoscience, Inc.
  Tim Hull, PG, LSRP, Princeton Geoscience, Inc.

- **June 24, 2021 – LSRPA Member "Chat" Session**

  Candace Baker, LSRP and Association Treasurer
  Kathi Stetser, PG, LSRP, Vice President, GEI Consultants and Vice-Chair of the Regulatory Outreach Committee
  Bill Hose, LSRPA Assistant Executive Director

- **July 20, 2021 – Member Regulatory Roundtable** (1 Reg/.5 Tech CECs)

  Fill Material Guidance for SRP Sites

  Rodger Ferguson, LSRP, PennJersey Env. Consulting

Visit LSRPA.org for details and registration

Upcoming LSRPA Courses & Events

- **August 5, 2021 – 2021 Standards Rule: Issues and Application**

  Candace Baker, LSRP, Langan Engineering and Environmental Services, Inc.,
  Michael Gonshor, LSRP, Roux Associates
  Brandi Gray, LSRP, Langan Engineering and Environmental Services, Inc.,
  Scott Drew, LSRP, Geosyntec Consultants

UPCOMING NJDEP TRAININGS

- **June 15, 2021 – Alternative Remediation Standards Technical Guidance**

- **July 14, 2021 – NJDEP/LSRPA Soil and GW Remedial Action Protectiveness/Biennial Certification Forms Training**

Visit LSRPA.org for details and registration

Upcoming Event

Upcoming Event


NJ LICENSED SITE REMEDIATION
LSRPA
PROFESSIONALS ASSOCIATION

Thank You!

Introduction and Summary

Dr. Swati Toppin, PhD, Rule Manager
Bureau of Environmental Evaluation and Risk Assessment
swati.toppin@dep.nj.gov

Committee Members

Judith Andrejko
Chelsea Bray
Bill Carp
Ann Charles
Carey Compton (retired)
Barry Frasco
Anne Hayton (retired)
Nicole Kalaigian
Allan Motter
Paul Sanders (retired)
Erica Snyder
Swati Toppin

Statutory Authority for the Remediation Standards

- Remediation Standards, N.J.A.C. 7:26D, adopted by the DEP on May 17, 2021

- Authority Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12

Today's Objectives

- Locating and navigating the Remediation Standards website
- Rule Subchapters
  - Appendices 6, 7, 8 and 9 will be covered in the ARS guidance training
- The changes in the Rule Amendment for the various exposure pathways
- Phase-in guidance and order of magnitude

Remediation Standards Website

https://www.nj.gov/dep/srp/guidance/rs/

Remediation Standards

Introduction to Remediation Standards

May 2021

These rules implement the provisions of the Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12, and other statutes, by establishing standards for the remediation of contaminated ground water, surface water, soil, soil leachate and indoor air. These rules supplement the requirements of the Technical Requirements for Site Remediation rules, N.J.A.C. 7:26E.

On June 2, 2008, the Department adopted new Remediation Standards rules at N.J.A.C. 7:26D. These rules were readopted without change on April 27, 2015. The soil remediation standards contained in those rules were effective on June 2, 2008. The ground water and surface water remediation standards were previously effective at N.J.A.C. 7:26E-1.13.

On September 18, 2017, the Department updated the soil remediation standards for 19 contaminants, as listed in N.J.A.C. 7:26D, Appendix 1, Tables 1A and 1B. The updated soil remediation standards reflect revisions to the toxicity information for these contaminants, as contained in the United States Environmental Protection Agency (USEPA) Integrated Risk Information System (IRIS) database (see www.epa.gov/iris), on which the soil remediation standards are based.

On May 17, 2021, the Department adopted amended rules at N.J.A.C. 7:26D. Included in the amended rules are soil and soil leachate remediation standards for the migration to ground water exposure pathway and indoor air remediation standards for the vapor intrusion exposure pathway. Also included is the replacement of direct contact soil remediation standards with separate soil remediation standards for the inhalation exposure pathway and the ingestion-dermal exposure pathway. In addition, the rule amendments Expands the existing interim remediation standard process to include soil and soil leachate for the migration to ground water exposure pathway, indoor air for the vapor intrusion exposure pathway, and ground water. Also, the existing process for updating remediation standards has been expanded to include soil and soil leachate for the migration to ground water exposure pathway, indoor air for the vapor intrusion exposure pathway, and ground water. The existing alternative remediation standards process has been expanded to include soil and soil leachate for the migration to ground water exposure pathway and indoor air for the vapor intrusion exposure pathway.

Remediation Standards

- Remediation Standards, N.J.A.C. 7:26D (May 17, 2021)
- Remediation Standards Proposal (April 6, 2020)
- Remediation Standards Adoption Package (May 17, 2021)

Phase In/Order of Magnitude Guidance

The Department has revised the following guidance documents that will help remediating parties comply with the new remediation standards:

- Phase-In Period Guidance for the Use of Remediation Standards, N.J.A.C. 7:26D (Updated May 2021)
- Order of Magnitude Evaluation Guidance (Updated May 2021)

Basis and Background Documents

- Soil and Soil Leachate Remediation Standards for the Migration to Ground Water Exposure Pathway, Basis and Background (May 2021)
- Soil Remediation Standards for the Ingestion-Dermal Exposure Pathway, Basis and Background (May 2021)
- Soil Remediation Standards for the Inhalation Exposure Pathway, Basis and Background (May 2021)
- Indoor Air Remediation Standards for the Vapor Intrusion Exposure Pathway, Basis and Background (May 2021)

Guidance Documents

- Alternative Remediation Standards Technical Guidance for Soil and Soil Leachate for the Migration to Ground Water Exposure Pathway (Version 1.0 May 2021)

- Alternative Remediation Standards Technical Guidance for Soil and Soil Leachate for the Migration to Ground Water Exposure Pathway (Version 1.0 May 2021)
- Alternative Remediation Standards Technical Guidance for Soil for the Ingestion-Dermal and Inhalation Exposure Pathways (Version 1.0 May 2021)
- Vapor Intrusion Technical Guidance (Version 5.0 May 2021) - Appendix G provides guidance for the derivation and application of Alternative Remediation Standards for indoor air

Calculators

The Soil and Soil Leachate Migration to Ground Water Exposure Pathway Calculator

- Soil and Soil Leachate Migration to Ground Water Exposure Pathway Calculator (Version 1.0 May 2021)

This includes the following calculators:

- Soil-Water Partition Equation Calculator
- Synthetic Precipitation Leaching Procedure Calculator
- Dilution-Attenuation Factor Calculator
- Fraction Organic Carbon Calculator

Soil Ingestion-Dermal Exposure Pathway Calculator

- Soil Ingestion-Dermal Exposure Pathway Calculator (Version 1.0 May 2021)

Soil Inhalation Exposure Pathway Calculator

- Soil Inhalation Exposure Pathway Calculator (Version 1.0 May 2021)

Vapor Intrusion Exposure Pathway Calculator

- Vapor Intrusion Exposure Pathway Calculator (Version 1.0 May 2021)

The Extractable Petroleum Hydrocarbon Ingestion-Dermal Exposure Pathway Calculator:

- Extractable Petroleum Hydrocarbon Ingestion-Dermal Exposure Pathway Calculator (Version 1.0 May 2021)

This includes the following calculators:

- Category 2 Sample-Specific Residential
- Category 2 Sample-Specific Non-Residential
- Category 1 and 2 Alternative Remediation Standards for Soil (based on Land Use Exposure Scenarios)

Extractable Petroleum Hydrocarbon Information

- Evaluation of Extractable Petroleum Hydrocarbons in Soil Technical Guidance (Version 1.0, 2019)
- Guidance on the Human Health Based and Ecologically Based Soil Remediation Criteria for Number 2 Fuel Oil and Diesel Fuel Oil (September 2008)

Chromium

- Chromium

Alternative or Interim Remediation Standards and or Screening Level Application Forms

- Alternative or Interim Remediation Standards and or Screening Level Application Form and Instructions
- Remediation Standards Notification Spreadsheet

NOTE: The following attainment and compliance documents which pertain specifically to the migration to ground water exposure pathway may be accessed at www.nj.gov/dep/srp/guidance/

- Volatile Organic Contamination including methyl tertiary butyl ether (MTBE) and tertiary butyl alcohol (TBA) derived from discharges of Petroleum Mixtures
  Posted 25 January 2009
- Capping of Inorganic and Semi-volatile Contaminants for the Impact to Ground Water Pathway (March 2014)
- Capping of Volatile Contaminants for the Impact to Ground Water Pathway (January 2019)

Remediation Standards Archive page

Rule Amendments

The Impact to Ground Water Soil Screening Levels and Site-Specific Impact to Ground Water Soil Remediation Standards have been replaced with Soil and Soil leachate standards for the Migration to Ground Water (MGW) Exposure Pathway

Rule Amendments

Indoor Air Screening Levels replaced with Indoor Air Remediation Standards for the Vapor Intrusion exposure pathway

Rule Amendments

This has led to the alternative remediation standard procedure being expanded to include the soil and soil leachate standards for the MGW pathway, and indoor air standards for the vapor intrusion pathway

Rule Amendments

- Replacement of direct contact remediation standards with the ingestion-dermal and inhalation standards

- Definition of residential and non-residential are now based on property use, not purported exposure

Rule Amendments

- Procedures have been established for developing interim remediation standards for the following:
  - interim soil and soil leachate standards for the MGW pathway
  - interim indoor air standards for the VI exposure pathway
  - interim ground water standards

Rule Amendments

- Procedures have been established for updating the standards for the following:
  - soil and soil leachate standards for the MGW pathway
  - indoor air standards for the vapor intrusion pathway
  - ground water remediation standards

Rule Amendments

- Chemicals have been deleted and added based upon routine detection, frequency of detection, routine analysis and available toxicity factors
- Numerical changes in new remediation standards have taken place due to updated toxicities, exposure assumptions and chemical and physical factors

Rule Amendments

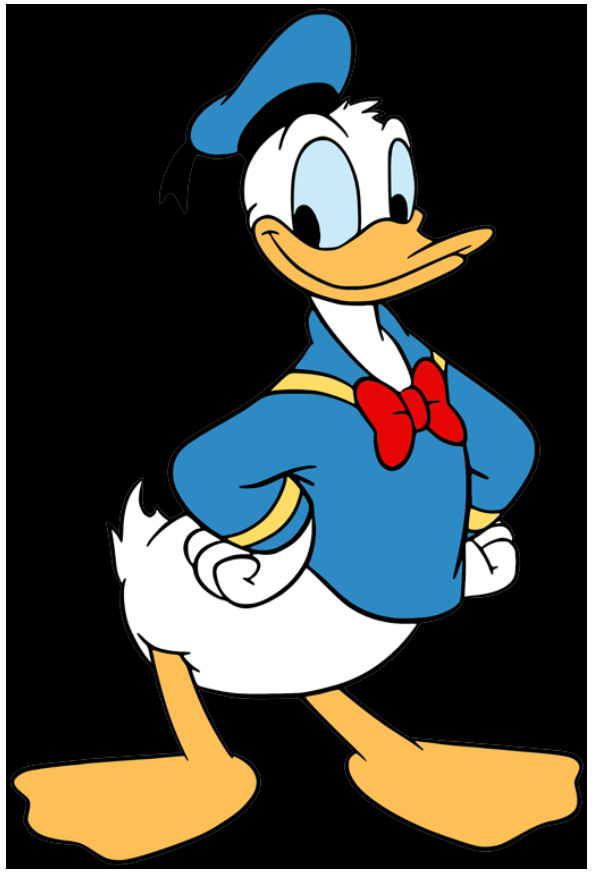
Subsequent talks on the various exposure pathways will highlight the important changes for each pathway

Thank you!

Remediation Standards – N.J.A.C. 7:26D
Overview of Subchapters 1 through 3

Barry Frasco, Ph.D., Assistant Director
Hazardous Site Science Element
barry.frasco@dep.nj.gov

National Donald Duck Day



June 9, 1934 - First appearance of Donald Duck in a cartoon, "The Wise Little Hen."

Remediation Standards – N.J.A.C. 7:26D General Information

Subchapter 1

- 7:26D-1.1 Purpose
- 7:26D-1.2 Scope
- 7:26D-1.3 Construction and severability
- 7:26D-1.4 Applicability – Includes phase in provisions
- 7:26D-1.5 Definitions

Ground Water Remediation Standards

Subchapter 2

- No substantive changes
- The Ground Water Quality Standards (N.J.A.C. 7:9C) are by reference the ground water remediation standards

Surface Water Remediation Standards

Subchapter 3

- No substantive changes
- The Surface Water Quality Standards (N.J.A.C. 7:9B) are by reference the surface water remediation standards

Remediation Standards – N.J.A.C. 7:26D

Questions?

Soil Remediation Standards for the Ingestion-Dermal Exposure Pathway

Erica Snyder, M.S.
Bureau of Environmental Evaluation and Risk Assessment
erica.snyder@dep.nj.gov

Soil Remediation Standards (SRS) for the Ingestion-Dermal Exposure Pathway

- 131 ingestion-dermal SRS for the residential exposure scenario
- 128 ingestion-dermal SRS for the nonresidential exposure scenario

What has changed since the rule proposal?

- Dermal absorption fractions (ABS_d) for 12 contaminants were adjusted to be consistent with USEPA
  - 11 of the affected contaminants went from an ABS_d of 0.1 to none
  - 1 contaminant (lindane) went from an ABS_d of 0.1 to 0.04
  - All 12 modifications resulted in ingestion-dermal SRS less stringent than the originally proposed value
- N.J.A.C. 7:26D Appendix 1 (Tables 1 and 2) and Appendix 11 (Table 1) updated

What has changed since the rule proposal?

- The proposed ingestion-dermal SRS for n-hexane and 4-methyl-2-pentanone (MIBK) were withdrawn due to inadequate toxicity information to derive health-based criteria
  - Proposed SRS based on HEAST RfDs which were both retired due to inadequate data to derive a chronic RfD
- N.J.A.C. 7:26D Appendix 1 (Tables 1 and 2) and Appendix 11 (Table 1) updated

What has changed since the rule proposal?

- The human health-based criteria for benzaldehyde, benzo(a)pyrene, and 1,2-dichloropropane were updated in N.J.A.C. 7:26D Appendix 1, Tables 1 and 2
  - These updates did not change the proposed SRS value

SRS for the ingestion-dermal exposure pathway vs. USEPA ingestion-dermal RSLs

- 14 ingestion-dermal SRS more stringent than USEPA RSLs
- 10 contaminants are due to the Department's toxicological hierarchy
  - Benzene, carbon tetrachloride, chlordane, chlorobenzene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,1-dichloroethene, trans-1,2-dichloroethene, methylene chloride, and xylene

SRS for the ingestion-dermal exposure pathway vs. USEPA ingestion-dermal RSLs

- 2 contaminants are due to the Department's Group C Carcinogen Policy
  - 2-methylphenol and 4-methylphenol
- 2 contaminants are not listed on USEPA's RSL Tables
  - 1,3-dichlorobenzene and tertiary butyl alcohol (TBA)

Hierarchy for Toxicity Source Information Ingestion-Dermal Exposure Pathway

- Tier 1: New Jersey Drinking Water Quality Institute (NJDWQI)
- Tier 2: USEPA's Integrated Risk Information System (IRIS)
- Tier 3: USEPA's Provisional Peer-Reviewed Toxicity Values (PPRTV), USEPA's Health Effects Assessment Summary Tables (HEAST), California Environmental Protection Agency (CalEPA), Agency for Toxic Substances and Disease Registry (ATSDR)

Department's Group C Carcinogen Policy

- Department policy used to develop health-based remediation standards, drinking water MCLs, ground water quality criteria, and human health-based surface water quality criteria

Department's Group C Carcinogen Policy

- Defined as "Possible Human Carcinogens" by USEPA under the 1986 Guidelines for Carcinogen Assessment
- Defined as having "Suggestive Evidence of Carcinogenic Potential" by USEPA under the 2005 Guidelines for Carcinogen Assessment

Department's Group C Carcinogen Policy

- If cancer toxicity factor available, carcinogenic health-based criteria calculated using 1×10^{-6} cancer risk target
- Additional uncertainty factor of 10 applied to noncancer toxicity factor to account for potential carcinogenic effects when a cancer toxicity factor is unavailable

Department's Group C Carcinogen Policy

- N.J.A.C. 7:26D Appendix 11, Table 1 identifies 14 contaminants that are classified as Group C Carcinogens
- Uncertainty factor applied to noncancer RfD:
  - atrazine, 2-methyphenol, 4-methyphenol
- Cancer slope factor available to calculate carcinogenic health-based criteria:
  - butylbenzylphthalate, dibromochloromethane, beta-HCH, hexachloro-1,3-butadiene, isophorone, and 1,1,2-trichloroethane

Department's Group C Carcinogen Policy

- NJDWQI/NJDEP RfD with Group C Carcinogen adjustment already incorporated:
  - 1,4-dichlorobenzene, 1,1-dichloroethane, MTBE, naphthalene, tertiary butyl alcohol (TBA)

Route-to-Route Extrapolation

- Use of route-to-route extrapolation restricted unless physiological-based pharmacokinetic (PBPK) modeling conducted in the generation of toxicity value
- N.J.A.C. 7:26D Appendix 11, Table 1 footnotes contain details for 10 oral toxicity values where route-to-route extrapolation was applied and whether its use was supported with PBPK modeling
  - Oral toxicity values for 3 contaminants (benzene, PCE, TCE) were supported with PBPK modeling

Mutagenic Mode of Action

- Mutagenicity refers to the capacity to induce or increase the rate of genetic change
- Some contaminants have been determined to have a mutagenic mode of action or early lifetime exposure component
  - Carcinogenic PAHs, TCE, vinyl chloride

SRWMP made the policy decision to not include mutagenic mode of action calculations in the development of SRS. No change from former rule.

Lead

- SRS for lead to remain unchanged from 2008 SRS
  - Residential ingestion-dermal SRS: 400 ppm
  - Nonresidential ingestion-dermal SRS: 800 ppm
- Department waiting for USEPA to update its national policy regarding lead
  - USEPA's Regional Screening Levels Tables and Regional Removal Management Levels Tables continue to use 400 ppm (residential) and 800 ppm (nonresidential)

Test Your Knowledge

True or False:

The SRS for lead have changed from the 2008 SRS:

A. True

B. False

Test Your Knowledge

True or False:

The SRS for lead have changed from the 2008 SRS:

A. True

B. False

Dioxin

- Term "dioxin" refers to a mixture of polychlorinated dioxin and furan congeners that are similar in structure and toxicity
- Ingestion-Dermal SRS added to N.J.A.C. 7:26D, Tables 1 and 2 for the residential (51 ppt) and nonresidential (810 ppt) land use exposure scenarios
  - SRS based on IRIS noncancer RfD (2012)
- Toxicity of mixture assessed in relation to 2,3,7,8-TCDD using congener specific toxic equivalency factors (TEFs)

Additional Information on the SRS for the Ingestion-Dermal Exposure Pathway

- Soil Remediation Standards for the Ingestion-Dermal Exposure Pathway, Basis and Background
- Soil Ingestion-Dermal Exposure Pathway Calculator

https://www.nj.gov/dep/srp/guidance/rs/index.html

Thank you!

Extractable Petroleum Hydrocarbons (EPH)

Nicole Kalaigian
Bureau of Environmental Evaluation & Risk Assessment
nicole.kalaigian@dep.nj.gov

EPH Categories

- Category 1:
  - No. 2 heating oil and diesel fuel
- Category 2:
  - heavier petroleum products
  - excludes lighter petroleum products (gasoline and mineral spirits)

Nos. 4 & 6 Heating Oil, Hydraulic Oil, Cutting Oil, Lubricating Oil
Crude Oil
Waste Oil, Unknown Petroleum Hydrocarbons
Waste Vehicular Crankcase Oil
Mineral Oil
Dielectric Fluid, Dielectric Mineral Oil, Transformer Oil

Changes

Former SRC

- Category 1 EPH
  - RDCSRC = 5,100 mg/kg
  - NRDCSRC = 54,000 mg/kg*
- Category 2 EPH
  - RDCSRC = sample specific*
  - NRDCSRC = sample specific*

May 2021 Remediation Standards

- Category 1 EPH
  - RDCSRS = 5,300 mg/kg
  - NRDCSRS = 75,000 mg/kg*
- Category 2 EPH
  - RDCSRS = sample specific*
  - NRDCSRS = sample specific*

*Product Limits

EPH Guidance & Calculator Options

12.

Evaluation of Extractable Petroleum Hydrocarbons in Soil Technical Guidance

Brief Description of Document
This technical guidance replaces the previous Protocol For Addressing Extractable Petroleum Hydrocarbons (EPH Protocol, Version 3.0, 9 August 2010)

Document:

Evaluation of Extractable Petroleum Hydrocarbons in Soil Technical Guidance [pdf 1.6 Mb]
Version 1.0, Posted 6/20/2019

Extractable Petroleum Hydrocarbons Alternative Product Limit Calculator [xlsm 115 Kb]
Version 1.1, Posted 12/3/2019

Former health-based SRC calculator →

Extractable Petroleum Hydrocarbons Category 2 Health Based Calculator [xlsm 70 Kb]
Version 1.0, Issued 6/2019

Extractable Petroleum Hydrocarbon Ingestion-Dermal Exposure Pathway Calculator [xlsm 70 Kb]
Version 1.0, Posted 5/17/2021

2021 Remediation Standards →

Response to Comments:

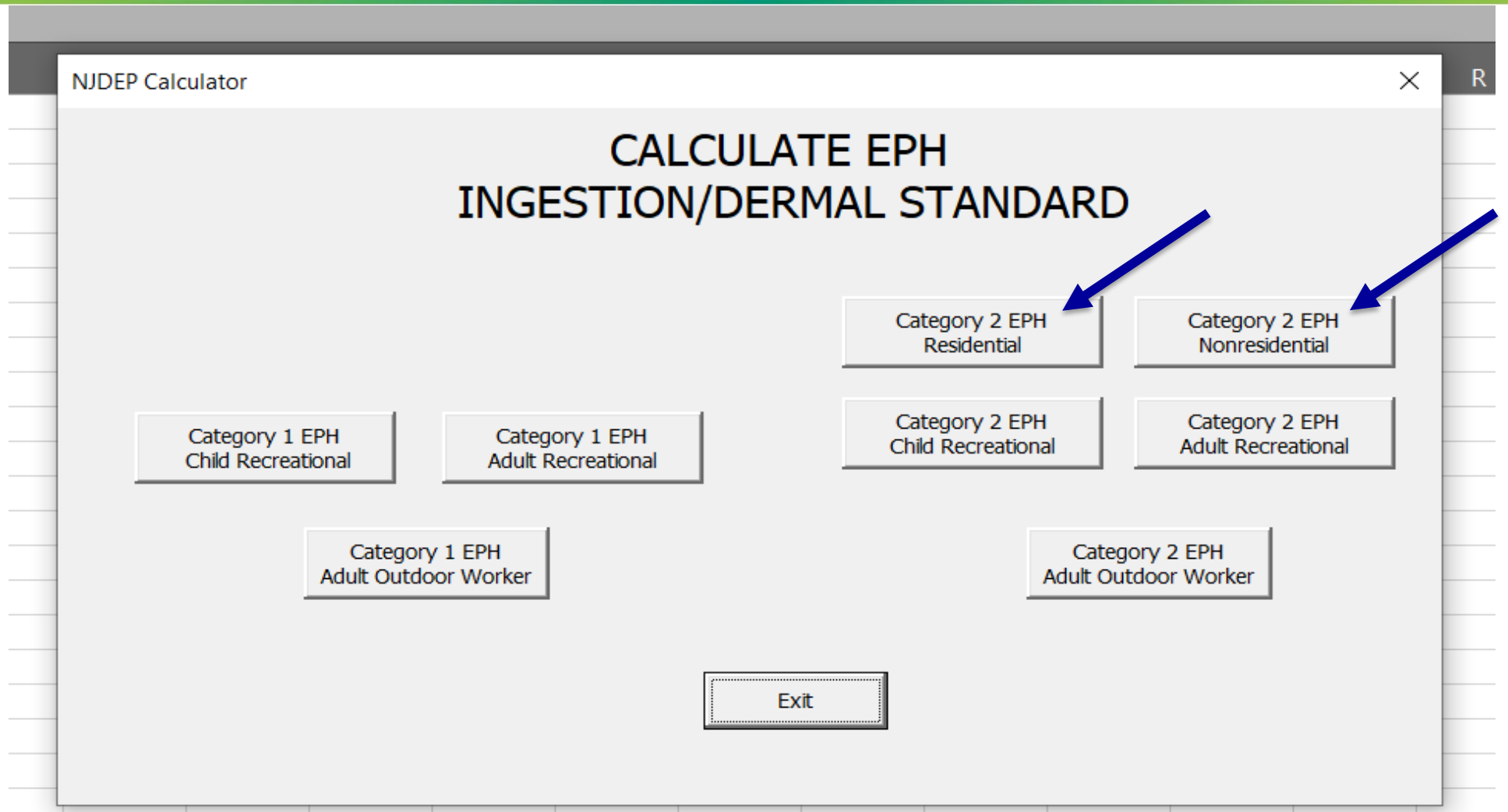
Evaluation of Extractable Petroleum Hydrocarbons in Soil Response to Comments [pdf 238 Kb]
Posted 6/20/2019

EPH Ingestion-Dermal Exposure Calculator

- Category 2 Sample-Specific Residential
- Category 2 Sample-Specific Nonresidential
- Category 1 and 2 Alternative Remediation Standards for Soil (based on land use exposure scenarios)

N.J.A.C. 7:26D Appendix 2 Equation 5:
Noncarcinogenic Ingestion-Dermal Human Health-Based Criteria for EPH

EPH Ingestion-Dermal Exposure Calculator



NJDEP 2021 EPH Category 2 Ingestion/Dermal Residential Calculator

Site Name:		Date:	
Sample ID:		Evaluated by:	

$$ECFV = \frac{THQ * AT * ED * BW}{(EF * ED * 10^{-6} kg/mg) * [(\frac{1}{RfD_o} * IR) + (\frac{1}{RfD_D} * SA * AF * ABS_d)]}$$

$$ID_{sc} = \frac{THQ}{\frac{f_{(1)}}{ECFV_{(1)}} + \frac{f_{(2)}}{ECFV_{(2)}} + \frac{f_{(3)}}{ECFV_{(3)}} + \frac{f_{(4)}}{ECFV_{(4)}} + \frac{f_{(5)}}{ECFV_{(5)}} + \frac{f_{(6)}}{ECFV_{(6)}} + \frac{f_{(7)}}{ECFV_{(7)}} + \frac{f_{(8)}}{ECFV_{(8)}}}$$

	(PHC Mixture)	AL12-16 (PHC Mixture)	AL16-21 (Mineral Oil)	AL21-34 (Mineral Oil)	AR10-12 (Naphthalene)	(Acenaphthalene)	AR16-21 (Fluorene)	(Fluoranthene)
RfD_o	0.1	0.1	2	2	0.041	0.06	0.04	0.04
RfD_D	0.1	0.1	2	2	0.041	0.06	0.04	0.04
ABS_d	0.1	0.1	0.1	0.1	0.13	0.13	0.13	0.13
Child ECFV	6321	6321	126427	126427	2451	3586	2391	2391
on of fraction (mg/kg)	Enter concentration	Enter concentration	Enter concentration	Enter concentration	Enter concentration	Enter concentration	Enter concentration	Enter concentration
f								

Calculated or locked cell
Required data entry
Optional data entry/modification

Reset

Back to EPH Menu

Exit

Enter EPH Concentration for each fraction. ND=0

Parameter	*Definition*	*Units*	*Residential Scenario*
THQ	Target Hazard Quotient	unitless	1
AT	Averaging Time	days/year	365
EF_c	Exposure Frequency - child	days/year	350
ED_c	Exposure Duration - child	years	6
RfD_o	Oral Reference Dose	mg/kg-day	see above
RfD_D	Dermal Reference Dose	mg/kg-day	see above
ABS_d	Dermal Absorption Fraction	unitless	see above
BW_c	Body Weight - child	kg	15
IR_c	Soil Ingestion Rate - child	mg/day	200
SA_c	Skin Surface Area - child	cm^2/day	2373
AF_c	Soil Adherence Factor - child	mg/cm^2	0.2
ECFV	Equivalent carbon fraction value	mg/kg-day	see above
f	EC Weight fraction = fraction concentration/total	unitless	see above
ID_{sc}	**Residential Non-carcinogenic Health-Based Soil Criterion (ingestion/dermal)**	mg/kg	

These parameters are fixed at the default residential values.

Total EPH:
mg/kg
Allowable EPH in sample:
mg/kg

EPH Category 2 Ingestion/Dermal Residential Soil Remediation Standard:
mg/kg

RESULT DOWN HERE

NJDEP 2021 EPH Category 2 Ingestion/Dermal Residential Calculator

Site Name:		Date:	
Sample ID:		Evaluated by:	

$$ECFV = \frac{THQ * AT * ED * BW}{(EF * ED * 10^{-6} kg/mg) * [(\frac{1}{RfD_d} * IR) + (\frac{1}{RfD_p} * SA * AF * ABS_d)]}$$

$$ID_{ss} = \frac{THQ}{\frac{f_{(1)}}{ECFV_{(1)}} + \frac{f_{(2)}}{ECFV_{(2)}} + \frac{f_{(3)}}{ECFV_{(3)}} + \frac{f_{(4)}}{ECFV_{(4)}} + \frac{f_{(5)}}{ECFV_{(5)}} + \frac{f_{(6)}}{ECFV_{(6)}} + \frac{f_{(7)}}{ECFV_{(7)}} + \frac{f_{(8)}}{ECFV_{(8)}}}$$

	AL10-12 (PHC Mixture)	AL12-16 (PHC Mixture)	AL16-21 (Mineral Oil)	AL21-34 (Mineral Oil)	AR10-12 (Naphthalene)	AR12-16 (Acenaphthalene)	AR16-21 (Fluorene)	AR21-34 (Fluoranthene)
RfD_d	0.1	0.1	2	2	0.041	0.06	0.04	0.04
RfD_p	0.1	0.1	2	2	0.041	0.06	0.04	0.04
ABS_d	0.1	0.1	0.1	0.1	0.13	0.13	0.13	0.13
Child ECFV	6321	6321	126427	126427	2451	3586	2391	2391
Concentration of fraction (mg/kg)	334	2187	563	648	0	1098	422	96
f	0.062453254	0.408937921	0.105272999	0.121166791	0	0.205310396	0.078908003	0.017950636

Calculated or locked cell
Required data entry
Optional data entry/modification

Reset

Back to EPH Menu

Exit

Enter EPH Concentration for each fraction. ND=0

Parameter	*Definition*	*Units*	*Residential Scenario*
THQ	Target Hazard Quotient	unitless	1
AT	Averaging Time	days/year	365
EF_c	Exposure Frequency - child	days/year	350
ED_c	Exposure Duration - child	years	6
RfD_d	Oral Reference Dose	mg/kg-day	see above
RfD_p	Dermal Reference Dose	mg/kg-day	see above
ABS_d	Dermal Absorption Fraction	unitless	see above
BW_c	Body Weight - child	kg	15
IR_c	Soil Ingestion Rate - child	mg/day	200
SA_c	Skin Surface Area - child	cm^2/day	2373
AF_c	Soil Adherence Factor - child	mg/cm^2	0.2
ECFV	Equivalent carbon fraction value	mg/kg-day	see above
f	EC Weight fraction = fraction concentration/total concentration	unitless	see above
ID_{ss}	**Residential Non-carcinogenic Health-Based Soil Criterion (ingestion/dermal)**	mg/kg	5700

These parameters are fixed at the default residential values.

Total EPH: 5348 mg/kg

Allowable EPH in sample: 5.70E+03 mg/kg

PASS

EPH Category 2 Ingestion/Dermal Residential Soil Remediation Standard:
5700 mg/kg

RESULT DOWN HERE

Thank You

For questions regarding EPH:

william.carp@dep.nj.gov

nicole.kalaigian@dep.nj.gov

Inhalation Exposure Pathway Alternative Remediation Standards

Allan S. Motter
Bureau of Environmental Evaluation and Risk Assessment
allan.motter@dep.nj.gov

Inhalation Exposure Pathway Alternative Remediation Standards

- Inhalation ARS based on physical properties does not require pre-approval from the Department prior to use (N.J.A.C. 7:26D-8.5)
- Technical Consultation with the Department is available upon request
- ARS Option details specified in N.J.A.C. 7:26D Appendix 7 and *Alternative Remediation Standards Technical Guidance for Soil for the Ingestion-Dermal and Inhalation Exposure Pathways*

Inhalation Exposure Pathway Alternative Remediation Standards

ARS options developed in accordance with N.J.A.C. 7:26D Appendix 7 III(b) (preapproval not required)

- Depth Range of Contamination
- Soil Organic Carbon Content (f_{oc})
- Fraction of Vegetative Cover (V)

Inhalation Exposure Pathway Alternative Remediation Standards

Depth Range of Contamination

- Default 0 cm to infinity
- Effects Volatiles Only
- Determine contaminant depth
  - d1 = shallowest depth at Site or AOC where contamination exceeds default standard
  - d2 = deepest depth at Site or AOC where contamination exceeds default standard

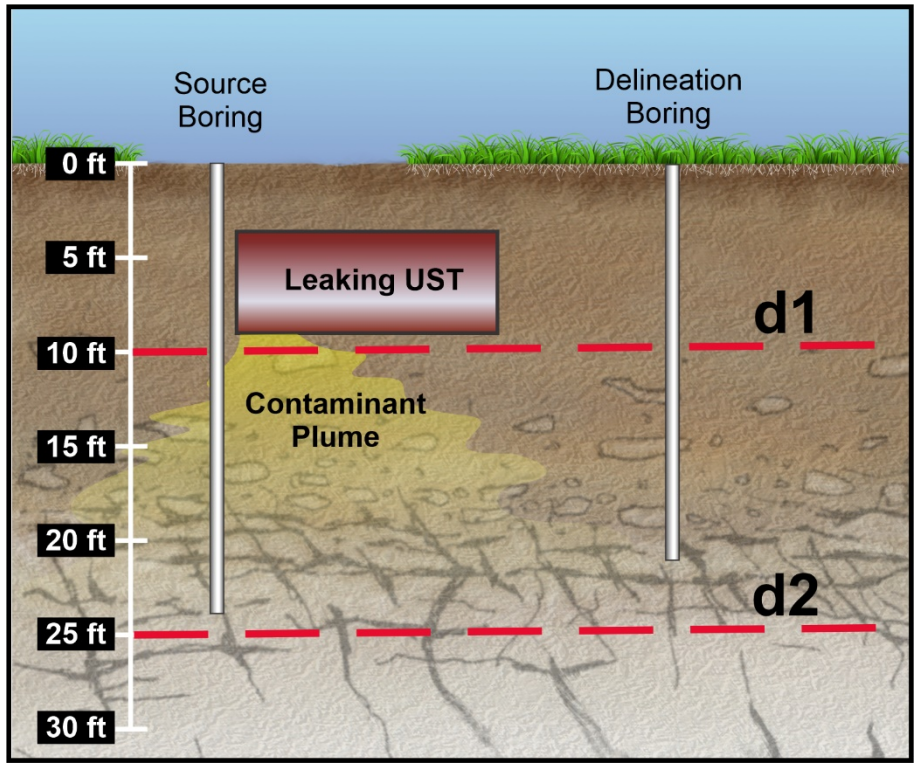
Inhalation Exposure Pathway Alternative Remediation Standards

Depth Range of Contamination

- Convert depths to cm
- Use d1 and d2 in the Department's calculator
- Provide the following information to the Department:
  - The resultant ARS
  - A description and basis of how the input parameters were selected
  - A description of any institutional and engineering controls
    - If depth starts at 0 cm, then no institutional control, otherwise need one

Inhalation Exposure Pathway Alternative Remediation Standards

Depth Range of Contamination



- d1 = 10 feet
  - 10 feet * 12 inches/foot = 120 inches
  - 120 inches * 2.54 cm/inch = 304.8 cm
- d2 = 25 feet
  - 25 feet * 12 inches/foot = 300 inches
  - 300 inches * 2.54 cm/inch = 762 cm

Inhalation Exposure Pathway Alternative Remediation Standards

Soil Organic Carbon Content (f_{oc})

- Default 0.2% (0.002) kg/kg
- Effects Volatiles Only
- Determine f_{oc} and use in the Department's calculator
- Provide the following information to the Department:
  - The resultant ARS
  - A description and basis of how the input parameters were selected
  - A description of any institutional and engineering controls

Inhalation Exposure Pathway Alternative Remediation Standards

Soil Organic Carbon Content (f_{oc})

- Collect and analyze samples for determining f_{oc} in accordance with Department guidance
  - Minimum of three samples
  - Not in areas of high organic contamination - interference
  - Representative of soil type and contaminant depth in AOC
- Analyze using Lloyd Kahn Method or equivalent

Test Your Knowledge

True or False:

When collecting samples to determine f_{oc} , the Department's guidance recommends a minimum of 3 samples.

A. True

B. False

Test Your Knowledge

True or False:

When collecting samples to determine f_{oc} , the Department's guidance recommends a minimum of 3 samples.

A. True

B. False

Inhalation Exposure Pathway Alternative Remediation Standards

Soil Organic Carbon Content (f_{oc})

- Average or lowest value (not less than 0.002):
  - Lowest if less than three samples
  - Lowest if difference is greater than an order of magnitude
  - Average if three or more samples and difference is less than an order of magnitude
- Calculator will determine appropriate f_{oc} if values are entered

Inhalation Exposure Pathway Alternative Remediation Standards

Fraction of Vegetative Cover (V)

- Default 50%
- Affects Particulates Only
- Determine V and use in the Department's calculator
- Provide the following information to the Department:
  - The resultant ARS
  - A description and basis of how the input parameters were selected
  - A description of any institutional and engineering control

Inhalation Exposure Pathway Alternative Remediation Standards

Fraction of Vegetative Cover (V)

- Impervious surfaces (concrete, asphalt, buildings) are not considered in V
- Vegetation and bare soil are considered in V
- V (versus soil) must be maintained and monitored to be an effective engineering control
- V is the amount of soil covered by vegetation using standard ecological techniques (e.g., grid or plot sampling)

Inhalation Exposure Pathway Alternative Remediation Standards

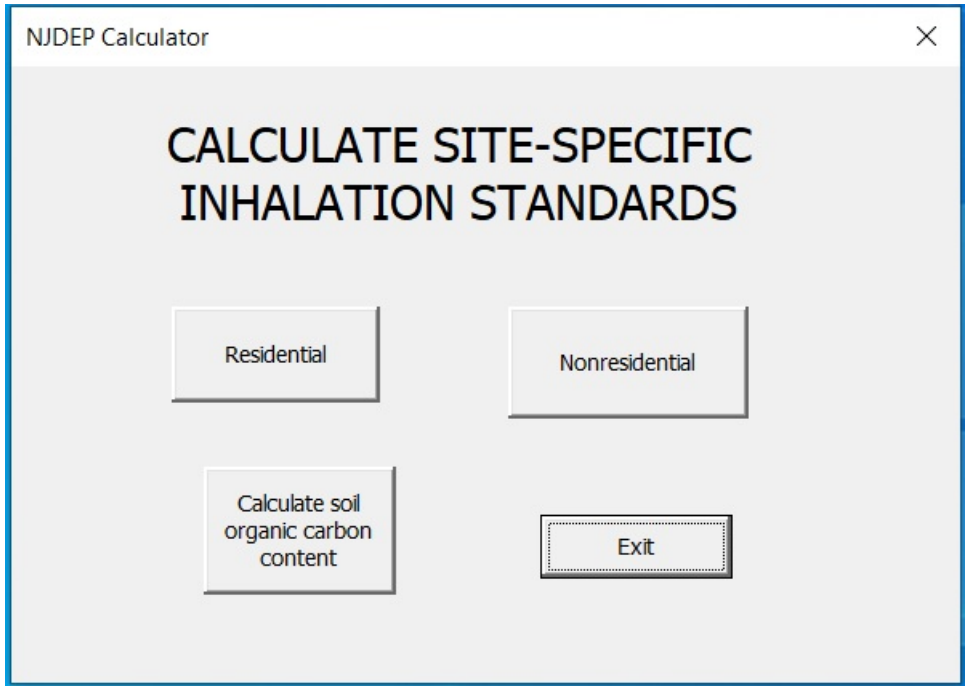
Fraction of Vegetative Cover (V)

50% Vegetation

50% Vegetation

100% Vegetation

Inhalation Exposure Pathway Alternative Remediation Standards



NJDEP 2021 Inhalation Soil Remediation Standard Calculator: Residential

Site Name:	Generic Contaminated Site	Date:	6/9/2021
Contaminant:	Naphthalene	CAS No.:	91-20-3
		Evaluated by:	LSRP

Contaminant Parameters:

Parameter	Definition	Units	Value
IUR	Inhalation Unit Risk Factor	$(\mu g/m^3)^{-1}$	3.40E-05
RfC	Inhalation Reference Concentratio	mg/m³	3.00E-03
D_i	Diffusivity in Air	cm²/s	6.05E-02
D_w	Diffusivity in Water	cm2/s	8.38E-06
D_a	Apparent Diffusivity	cm2/s	4.46E-06
K_{oc}	Soil Organic Carbon-Water Partition Coefficient	cm³/g	1.54E+03
K_d	Soil-Water Partition Coefficient	cm³/g	3.09E+00
H'	Henry's Law Constant	dimensionless	1.80E-02
RL	Soil Reporting Limit	mg/kg	0.17
S	Water Solubility	mg/L	3.10E+01
C_{sat}	Soil Saturation Limit	mg/kg	1.00E+02

Exposure Parameters:

Parameter	Definition	Units	Value
EF	Exposure Frequency	days/year	350
ED	Exposure Duration	years	26
ET	Exposure Time	hr/day	24
LT	Lifetime	years	70
T	Exposure Interval	seconds	8.20E+08
AT	Averaging Time	days/year	365
THQ	Target Hazard Quotient	dimensionless	1
TR	Target Cancer Risk	dimensionless	1.00E-06

Soil Parameters:

Parameter	Definition	Units	Value
θ_w	Water-filled Soil Porosity	dimensionless (v/v)	0.23
θ_a	Air-filled Soil Porosity	dimensionless (v/v)	0.18
f_{oc}	(Fraction) Organic Carbon Content of Soil	dimensionless (w/w)	0.002
ρ_b	Dry Soil Bulk Density	g/cm³	1.5
n	Total Soil Porosity	dimensionless (v/v)	0.41

Emission/Dispersion Parameters:

Parameter	Definition	Units	Value
Q/C	Inverse Concentration at Center of Source	$(g/m^2\text{-}s)/(kg/m^3)$	86.6
VF	Soil-to-Air Volatilization Factor	m³/kg	6.94E+04
TAVF	Time-averaged volatilization flux	mg/cm²/day	Optional Calculated
PEF	Particulate Emission Factor	m³/kg	1.67E+09

Scenario Parameters:

Parameter	Definition	Units	Value
LL1	Depth of Top of Contamination	cm	Optional
LL	Depth of Bottom of Contaminantion	cm	Optional
V	Fraction Vegetative Cover	dimensionless	0.5

If values entered, click here to recalculate VF

Calculated Inhalation Soil Criteria:

$Inh_{v,c}$	Volatile, Cancer	mg/kg	5.7
$Inh_{v,n}$	Volatile, Noncancer	mg/kg	220
$Inh_{p,c}$	Particulate, Cancer	mg/kg	140000
$Inh_{p,n}$	Particulate, Noncancer	mg/kg	5E+06

above Csat

>1E+06 ppm

Residential Inhalation Soil Remediation Standard:

5.7 mg/kg

CONTROLLED BY THE VOLATILE CARCINOGENIC PATHWAY

Soil Parameters:

Parameter	Definition	Units	Value
θ_w	Water-filled Soil Porosity	dimensionless (v/v)	0.23
θ_a	Air-filled Soil Porosity	dimensionless (v/v)	0.18
f_{oc}	(Fraction) Organic Carbon Content of Soil	dimensionless (w/w)	0.003
ρ_b	Dry Soil Bulk Density	g/cm^3	1.5
n	Total Soil Porosity	dimensionless (v/v)	0.41

changed

Scenario Parameters: depth range modified

Parameter	Definition	Units	Value
LL1	Depth of Top of Contamination	cm	304.8
LL	Depth of Bottom of Contaminantion	cm	7.62E+02
V	Fraction Vegetative Cover	dimensionless	0.5

If values entered, click here to recalculate VF

Calculated Inhalation Soil Criteria:

$Inh_{v,c}$	Volatile, Cancer	mg/kg	**3.9E+09**	*above Csat*
$Inh_{v,n}$	Volatile, Noncancer	mg/kg	**1.5E+11**	*above Csat*
$Inh_{p,c}$	Particulate, Cancer	mg/kg	**140000**	
$Inh_{p,n}$	Particulate, Noncancer	mg/kg	**5200000**	*>1E+06 ppm*

Residential Inhalation Soil Remediation Standard:

140000 mg/kg

CONTROLLED BY THE PARTICULATE CARCINOGENIC PATHWAY

Soil Parameters:

Parameter	Definition	Units	Value
θ_w	Water-filled Soil Porosity	dimensionless (v/v)	0.23
θ_a	Air-filled Soil Porosity	dimensionless (v/v)	0.18
f_{oc}	(Fraction) Organic Carbon Content of Soil	dimensionless (w/w)	0.003
ρ_b	Dry Soil Bulk Density	g/cm^3	1.5
n	Total Soil Porosity	dimensionless (v/v)	0.41

changed

Scenario Parameters: depth range modified

Parameter	Definition	Units	Value
LL1	Depth of Top of Contamination	cm	304.8
LL	Depth of Bottom of Contaminantion	cm	7.62E+02
V	Fraction Vegetative Cover	dimensionless	0.75

If values entered, click here to recalculate VF

changed

Calculated Inhalation Soil Criteria:

$Inh_{v,c}$	Volatile, Cancer	mg/kg	**3.9E+09**
$Inh_{v,n}$	Volatile, Noncancer	mg/kg	**1.5E+11**
$Inh_{p,c}$	Particulate, Cancer	mg/kg	**270000**
$Inh_{p,n}$	Particulate, Noncancer	mg/kg	**10000000**

above Csat

above Csat

>1E+06 ppm

Residential Inhalation Soil Remediation Standard:

270000 mg/kg

CONTROLLED BY THE PARTICULATE CARCINOGENIC PATHWAY

Questions?

BREAK

Migration to Ground Water Exposure Pathway

Dr. Swati Toppin, PhD, Rule Manager
Bureau of Environmental Evaluation and Risk Assessment
swati.toppin@dep.nj.gov

Migration to Ground Water Exposure Pathway

For Migration to Ground Water, begin by checking the contaminant concentration against the SRS-MGW standard,

not the Leachate Standard

Migration to Ground Water Exposure Pathway

- Standards for MGW exposure pathway

  <u>Has anything changed?</u>

  - Nothing much has changed in terms of implementing the pathway. Previously the pathway was known as Impact to Ground Water Pathway.
  - Previously the pathway still had to be addressed.
  - Instead of standards, there were screening levels (IGWSSLs). If a responsible party did not want to do site specific work, the IGWSSLs were used as site-specific standards.

Migration to Ground Water Exposure Pathway

- This step has been eliminated with the adoption of SRS-MGW.
- Previously, the contaminant in soil was compared to IGWSSL. Now, it must be compared to the SRS-MGW
- In both cases the option of doing real site-specific work to get an Alternative Remediation Standard, or to accept default SSLs as standards (in past) or SRS-MGW is the same.

Two Types of Standards

- Migration to Ground Water Soil Remediation Standard
- Soil Leachate Remediation Standard

Which MGW Standard Should I Use?

- To determine if MGW pathway could be an issue, compare the contaminant concentrations against SRS-MGW
- There is no compulsion to compare contaminant concentrations against the leachate standards
- Leachate is not an environmental medium and does NOT have to be sampled. It is used for an ARS.
  - Leachate results must be used as before, with SPLP spreadsheets.
  - Do not only compare leachate concentrations with leachate standards.
  - Use spreadsheet!!

Two Key Differences in How MGWSRS and IGWSSLs are Generated

- Both are based on the Soil Water Partition Equation, but the endpoint from which current SRS-MGW is calculated is the GWRS, not the health based GWQC
  - If the health based GWQC is lower than the PQL, the GWQS defaults to the PQL. This results in a higher endpoint, and therefore a higher standard.
- Csat – has been expanded so that the pathway is now not applicable to more contaminants than in the previous rule.
  - Previously only di-n-octyl phthalate dropped out due to Csat

Contaminants "Dropped" from MGW Pathway

- Acenaphthene
- Anthracene
- Benzo(a) pyrene
- Benzo (b)fluoranthene
- Benzo(k)fluoranthene
- 1,1-Biphenyl
- 2-Chloronapthalene
- Chrysene
- Dibenz(a,h) anthracene
- Di-n-butyl phthalate
- Di-n-octyl-phthalate
- Endosulfan I & Endosulfan II
- Fluoranthene
- Fluorene
- Indeno (1,2,,-cd)pyrene
- Methoxychlor
- Pyrene

Migration to Ground Water Basis and Background Document

- SRS-MGW are based on the Soil Water Partition Equation, same as used in USEPA Screening Levels

- However, values used in SRS-MGW are consistent with values pertinent to New Jersey rather than USEPA values (based on national values)

Migration to Ground Water
Basis and Background

- The Department's value for each parameter is compared to USEPA value, and an explanation offered for any differences

- Sensitivity analyses have been performed for many parameters

  -This shows where possible modifications of default values is most useful

How Many Old IGWSSLs Have Changed Compared to Current SRS-MGW?

- 18 remain unchanged
- 16 additional contaminants now dropped due to Csat
- An equal number have gone up (39) as have gone down (39)

Only 5 compounds have gone down by an order of magnitude

These are:

- Bis(2-ethylhexyl)phthalate
- copper
- 4,4'-DDE(p,p'-DDX)
- 4,4'-DDT
- hexachlorocyclopentadiene

Questions?

Indoor Air Remediation Standards for the Vapor Intrusion Exposure Pathway

Erica Snyder, M.S.
Bureau of Environmental Evaluation and Risk Assessment
erica.snyder@dep.nj.gov

Indoor Air Remediation Standards (IARS) for the Vapor Intrusion Exposure Pathway

- 35 IARS for the residential and nonresidential exposure scenarios
- 2 chemicals added to the list:
  - 1,4-dioxane
  - 1,2,4-trimethylbenzene

Indoor Air Remediation Standards (IARS) for the Vapor Intrusion Exposure Pathway

- 14 chemicals dropped from previous list
  - 3 chemicals not on USEPA's Target Compound List (bromoethene, 1,3-butadiene, 3-chloropropene)
  - 11 chemicals without appropriate toxicological information

What has changed since the proposed rule?

- No changes to proposed IARS
- N.J.A.C. 7:26D Appendix 11 (Table 3) updated to provide additional details on when the use of route-to-route extrapolation is restricted

Comparison of former 2013 Indoor Air Screening Levels and 2021 IARS

Residential IARS	
IARS Increasing	7
IARS Decreasing	12
IARS the Same	14
IARS Added	2
IARS Removed	14

Nonresidential IARS	
IARS Increasing	6
IARS Decreasing	9
IARS the Same	18
IARS Added	2
IARS Removed	14

- 1,1-Dichloroethene decreasing by an order of magnitude

Comparison of 2013 Indoor Air Screening Levels to 2021 Indoor Air Remediation Standards

Chemical	CAS No.	Residential Indoor Air		Nonresidential Indoor Air	
		Screening Levels	Remediation Standards	Screening Levels	Remediation Standards
		2013	2021	2013	2021
		µg/m³	µg/m³	µg/m³	µg/m³
Acetone (2-propanone)	67-64-1	32,000	-	140,000	-
Benzene	71-43-2	2	0.64	2	1.6
Bromodichloromethane	75-27-4	3	-	3	-
Bromoethene (vinyl bromide)	593-60-2	2	-	2	-
Bromoform	75-25-2	5	-	11	-
Bromomethane (methyl bromide)	74-83-9	5	5.2	22	22
1,3-Butadiene	106-99-0	1	-	1	-
2-Butanone (methyl ethyl ketone)	78-93-3	5,200	5,200	22,000	22,000
Carbon disulfide	75-15-0	730	730	3,100	3,100
Carbon tetrachloride	56-23-5	3	1.3	3	2
Chlorobenzene	108-90-7	52	52	220	220
Chloroethane (ethyl chloride)	75-00-3	10,000	10,000	44,000	44,000
Chloroform	67-66-3	2	100	2	430
Chloromethane (methyl chloride)	74-87-3	94	94	390	390
3-Chloropropene (allyl chloride)	107-05-1	2	-	2	-
Cyclohexane	110-82-7	6,300	6,300	26,000	26,000
Dibromochloromethane	124-48-1	4	-	4	-
1,2-Dibromoethane (ethylene dibromide)	106-93-4	4	1.5	4	1.5
1,2-Dichlorobenzene (o)	95-50-1	210	210	880	880
1,4-Dichlorobenzene (p)	106-46-7	3	830	3	3,500
Dichlorodifluoromethane (Freon 12)	75-71-8	100	-	440	-
1,1-Dichloroethane	75-34-3	2	-	8	-
1,2-Dichloroethane	107-06-2	2	7.3	2	31
1,1-Dichloroethene[1]	75-35-4	210	21	880	88
1,2-Dichloroethene (trans)	156-60-5	63	-	260	-
1,2-Dichloropropane	78-87-5	2	0.92	2	3.3
1,3-Dichloropropene (total)	542-75-6	2	0.91	3	3.1
1,4-Dioxane	123-91-1	-	0.72	-	2.5
Ethylbenzene	100-41-4	2	1.1	5	4.9
Hexachlorobutadiene	87-68-3	5	-	5	-
n-Hexane	110-54-3	730	730	3,100	3,100
Mercury, elemental	7439-97-6	1	1.0	1	1.3
Methylene chloride (dichloromethane)	75-09-2	96	280	1,200	1,200
4-Methyl-2-pentanone (MIBK)	108-10-1	3,100	3,100	13,000	13,000
Methyl tert-butyl ether (MTBE)	1634-04-4	9	11	47	47
Naphthalene	91-20-3	3	2.6	3	2.6
Styrene	100-42-5	1,000	1,000	4,400	4,400
1,1,2,2-Tetrachloroethane	79-34-5	3	-	3	-
Tetrachloroethene (PCE)	127-18-4	9	11	47	47
Toluene	108-88-3	5,200	5,200	22,000	22,000
1,2,4-Trichlorobenzene	120-82-1	4	3.7	9	8.8
1,1,1-Trichloroethane	71-55-6	5,200	5,200	22,000	22,000
1,1,2-Trichloroethane	79-00-5	3	-	3	-
Trichloroethene (TCE)	79-01-6	3	1.1	3	3

Residential IARS	
IARS Increasing	7
IARS Decreasing	12
IARS the Same	14
IARS Added	2
IARS Removed	14

Nonresidential IARS	
IARS Increasing	6
IARS Decreasing	9
IARS the Same	18
IARS Added	2
IARS Removed	14

Table can be found at:
https://www.nj.gov/dep/srp/guidance/vaporintrusion/

Basis for the changes to the IARS

- New toxicity information for 4 chemicals
  - 1,2-Dichloropropane; 1,4-dioxane; 1,1,2-Trichloro-1,2,2-trifluoroethane; 1,2,4-trimethylbenzene
  - Inhalation toxicity value hierarchy consistent with SRS for the inhalation exposure pathway, USEPA, and has not changed from former IASLs
- Department's Group C Carcinogen Policy
  - 1,1-Dichloroethene

Basis for the changes to IARS

- Mutagenic Mode of Action Calculations no longer applied
  - Methylene chloride
  - Trichloroethene
  - Vinyl chloride
- Route-to-route extrapolation restricted
  - Inhalation toxicity values for 2 chemicals (TCE and vinyl chloride) were supported with PBPK modeling

Basis for the changes to the IARS

- Exposure duration for residential land use (30 to 26 yrs)
- Lower reporting limits (RL) available for NJDEP-SRP Low Level USEPA TO-15 Air Analytical Method
  - 10 residential IARS and 2 nonresidential IARS based on RL
- 2 significant figures
  - Naphthalene, 1,2,4-trichlorobenzene, vinyl chloride, and ethylbenzene (nonresidential only) decreasing

Benzene

- 2013 Indoor Air Screening Levels: 2 µg/m^3
- 2021 Indoor Air Remediation Standards
  - Residential IARS: 0.64 µg/m^3
  - Nonresidential IARS: 1.6 µg/m^3
- IARS based on the analytical RL
- Use multiple lines of evidence approach to evaluate whether a completed vapor intrusion pathway exists

Background Contamination

- Indoor air sampling last step in the evaluation of the vapor intrusion pathway
- Ambient air sample(s) concurrent with IA samples
- Operational activities
  - Indeterminate VI Pathway status (VIT Section 3.5.2)
- Appendix D: Indoor Air Building Survey and Sampling Form
- Appendix F: Instructions for Occupants for Indoor Air Sampling Events

Additional Information on the IARS for the Vapor Intrusion Exposure Pathway

- Indoor Air Remediation Standards for the Vapor Intrusion Exposure Pathway, Basis and Background
- Vapor Intrusion Exposure Pathway Calculator

  https://www.nj.gov/dep/srp/guidance/rs/index.html

- Comparison of 2013 IASL and 2021 IARS Table

  https://www.nj.gov/dep/srp/guidance/vaporintrusion/

NJDEP Vapor Intrusion Contacts

- Erica Snyder – IARS and Vapor Intrusion Screening Levels
  - Erica.Snyder@dep.nj.gov

- Nicole Kalaigian – VI Investigation and Mitigation
  - Nicole.Kalaigian@dep.nj.gov

Thank you!

General Interactions Between Pathways

Dr. Swati Toppin, PhD, Rule Manager
Bureau of Environmental Evaluation and Risk Assessment
swati.toppin@dep.nj.gov

Relevant Standards

Soil Remediation Pathways

- Ingestion-dermal
- Inhalation
- Migration to ground water

How do I know which pathway is of concern?

All soil pathways need to be considered

If concentration is greater than the relevant standard, the exposure pathway is potentially of concern and must be addressed

Ingestion –Dermal & Inhalation Pathways

Reminder

Change from direct contact standards to separate standards for ingestion-dermal and inhalation standards

- For Ingestion-Dermal and Inhalation pathways check the contaminant concentration against the pathway standard
  - Both pathways had to be addressed previously, but were grouped together under direct contact

Pathway Interactions

There is nothing different from previous rule in terms of interactions

- All pathways where contaminant concentrations exceed the pathway standard need to be addressed for that contaminant
- The driver contaminant may change if an ARS is involved

Pathway Interactions: Example

Cadmium (Cd)

Ingestion-dermal pathway – Residential 71 ppm, Nonresidential 1,100ppm

Inhalation pathway - Residential 2,600 ppm, Nonresidential 12,000 ppm

Migration to ground water pathway 1.9 ppm

Originally, MGW pathway is the driver

but

If an ARS-MGW leads to Cd ARS-MGW of 1000 ppm, the Ingestion-Dermal pathway is now the driver

Questions?

LUNCH

DO NOT SIGN OUT OF THE WEBINAR!

Contact Information

Swati Toppin	Swati.toppin@dep.nj.gov
Barry Frasco	barry.frasco@dep.nj.gov
Allan Motter	allan.motter@dep.nj.gov
Erica Snyder	erica.snyder@dep.nj.gov
Nicole Kalaigian	nicole.kalaigian@dep.nj.gov

https://nj.gov/dep/srp/srra/srra_contacts.htm