Remediation Standards – N.J.A.C. 7:26D
Order of Magnitude for
Sites or Areas of Concern
with Remedial Action Permits

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Fun Fact

July 14th is National Mac and Cheese Day

Rule Applicability

The discussion of rule applicability focuses on:

- Soil remediation standards (ingestion-dermal, inhalation, and migration to ground water exposure pathways)
- Soil leachate remediation standards (migration to ground water exposure pathway)
- Indoor air remediation standards (vapor intrusion exposure pathway)

The May 17, 2021, Remediation Standards rule amendments did not affect:

Ground Water Remediation Standards

Surface Water Remediation Standards

Rule Applicability
(Sites or areas of concern with a Final Remediation Document)

Pursuant to the Brownfield Act at N.J.S.A. 58:10B-13e:

Sites or areas of concern that have a final remediation document (No Further Action Letter or Response Action Outcome) do not have to comply with subsequent changes in remediation standards unless a remediation standard has decreased by an order of magnitude or more compared to the prior remediation standard (default standards or site-specific standards)

Rule Applicability
(Sites or areas of concern with a Final Remediation Document)

The Brownfield Act at N.J.S.A. 58:10B-13e applies to restricted use, limited restricted use and unrestricted use remedial actions.

This presentation focuses on remedial actions that require a remedial action permit (restricted use and limited restricted use)

Order of Magnitude
N.J.S.A. 58:10B-13e

Sites or areas of concern impacted by a remediation standard that has decreased by an order of magnitude or more must conduct an evaluation to determine if the remedy at the site or area of concern remains protective ("order of magnitude evaluation")

Order of Magnitude N.J.S.A. 58:10B-13e

The order of magnitude evaluation is a two-step process:

Step 1: The concentrations of a given contaminant at the site or area of concern are compared against the new remediation standard

- If the difference between on-site concentrations and the new remediation standard are less than an order magnitude, then no further action is required
  - The remedial action protectiveness/biennial certification should include the results of this comparison. The deed notice and remedial action permit do not need to be modified.
- If the difference between on-site concentrations and the new remediation standard are an order magnitude or greater, then step 2 is required

Order of Magnitude
N.J.S.A. 58:10B-13e

Step 2: The site or areas of concern are evaluated to determine if the existing remedy remains protective based on the new remediation standard(s)

- If the evaluation determines that the remedy remains protective, no further action is required
  - If the deed notice and remedial action permit do not have the order of magnitude contaminant(s) listed, then the deed notice and remedial action permit will need to be modified to incorporate any new contaminant(s) that needs to be included.

Order of Magnitude N.J.S.A. 58:10B-13e

- If the evaluation determines the existing remedy is not protective, additional remediation is required to achieve compliance with the new remediation standard(s)
- If the site or area of concern can be remediated before the next remedial action protectiveness/biennial certification is due, the additional remediation can be conducted under the remedial action permit. The remediation must be documented in the next remedial action protectiveness/biennial certification submittal. If the remediation changed any aspect of the remedial action permit, then it will be necessary to terminate the deed notice, file a new deed notice, and modify the existing remedial action permit.

Order of Magnitude N.J.S.A. 58:10B-13e

- If the additional remediation will not be completed prior to the submittal of the next remedial action protectiveness/biennial certification, then such remediation will be conducted as a new case. This would include calling in the discharge to the Hotline (877-WARNDEP; 877- 927-6337) and the assignment of a new case number.
  - If the additional remediation results in order of magnitude contaminant concentrations remaining on the site that are less than an order of magnitude difference compared to the new remediation standard, no further remedial action is required. If the remediation changed any aspect of the remedial action permit, then it will be necessary to terminate the deed notice, file a new deed notice, and modify the existing remedial action permit.

Order of Magnitude

The following tables list, by exposure pathway, those contaminants whose May 17, 2021, remediation standards have decreased by an order of magnitude or more compared to the prior remediation standard (default or site specific).

Sites or areas of concern that have a final remediation document issued prior to November 18, 2021, must conduct an order of magnitude evaluation for the remediation standards contained in the tables.

Order of Magnitude Contaminants
Soil Ingestion-Dermal and Soil Inhalation Exposure Pathways
Soil Remediation Standards

Residential Exposure Scenario

Contaminant	CAS #	Prior Soil Remediation Standard (mg/kg)	2021 adopted soil remediation standard (mg/kg)
Benzaldehyde	100-52-7	6,100 (ingestion-dermal)	170 (ingestion-dermal)
Caprolactam	105-60-2	31,000 (ingestion-dermal)	290 (ingestion-dermal)
Cobalt (total)	744048-4	1,600 (ingestion-dermal)	23 (ingestion-dermal)
Ethylbenzene	100-41-4	7,800 (ingestion-dermal)	10 (inhalation)
Hexachlorocyclopentadiene	77-47-4	45 (inhalation)	2.7 (inhalation)

Non-Residential Exposure Scenario

Contaminant	CAS #	Prior Soil Remediation Standard (mg/kg)	2021 adopted soil remediation standard (mg/kg)
Benzaldehyde	100-52-7	68,000 (ingestion-dermal)	910 (ingestion-dermal)
Butylbenzyl phthalate	85-68-7	14,000 (ingestion-dermal)	1,300 (ingestion-dermal)
Caprolactam	105-60-2	340,000 (ingestion-dermal)	1,300 (inhalation
Ethylbenzene	100-41-4	110,000 (ingestion-dermal)	48 (inhalation)

Order of Magnitude Contaminants
Migration to Ground Water Exposure Pathway
Soil Water Partition Remediation Standards

Contaminant	CAS #	2013 former impact to ground water soil partition screening level (mg/kg)	2021 migration to ground water soil partition standard (mg/kg)
Bis(2-ethylhexyl)phthalate	117-81-7	1,200	14
Copper (total)	7440-50-8	11,000	910
4,4'-DDE (p,p'-DDX)	72-55-9	18	0.47
4,4'-DDT	50-29-3	11	0.67
Hexachlorocyclopentadiene	77-47-4	320	2.5

Order of Magnitude Contaminants
Vapor Intrusion Exposure Pathway
Indoor Air Remediation Standards

Residential Exposure Scenario

Contaminant	CAS #	Prior VI Residential Indoor air screening level (ug/m3)	2021 adopted VI Residential Indoor air remediation standard (ug/m3)
1,1-Dichloroethene (1,1-Dichloroethylene)	75-35-4	210	21

Non-Residential Exposure Scenario

Contaminant	CAS #	Prior VI Non-Residential Indoor air screening level (ug/m3)	2021 adopted VI Non-Residential Indoor air remediation standard (ug/m3)
1,1-Dichloroethene (1,1-Dichloroethylene)	75-35-4	880	88

Order of Magnitude
N.J.S.A. 58:10B-13e

Additional Complexity

Remediation standards have changed over time

Depending on the magnitude of change for a given contaminant, sites or areas of concern impacted by order of magnitude changes may vary in time depending on the contaminant in question

Order of Magnitude N.J.S.A. 58:10B-13e

Contaminant	1999 Residential Direct Contact Soil Cleanup Criteria (mg/kg)	2008 Residential Direct Contact Soil Remediation Standard (mg/kg)	2017 Residential Direct Contact Soil Remediation Standard (mg/kg)	2021 Residential Soil Ingestion-Dermal Health-Based Criterion Criterion (mg/kg)	2021 Residential Soil Inhalation Health-Based Criterion Criterion (mg/kg)
Contaminant subject to order of magnitude - Final remediation documents issued prior to 11/18/21					
Ethylbenzene	1,000	7,800	7,800	7,800	10
Contaminants subject to order of magnitude - Final remediation documents issued between 6/3/08 and 11/17/21					
Benzaldehyde	NR	6100	6100	170	NA
Contaminant subject to order of magnitude - Final remediation documents issued between 6/3/08 and 3/17/18					
1,1'-Biphenyl	NR	3,100	61	87	NA
Contaminant subject to order of magnitude - Final remediation documents issued prior to 3/18/18					
Cyanide	1,100	1,600	47	47	NA
Contaminants subject to order of magnitude - Final remediation documents issued prior to 12/3/08					
Naphthalene	230	6	6	2,500	5.7
Contaminants no longer subject to order of magnitude					
Chloroform	19	0.6	0.6	780	590

Order of Magnitude Contaminants
Soil Ingestion-Dermal and Soil Inhalation Exposure Pathways Soil Remediation Standards

Contaminants subject to order of magnitude - Final remediation documents issued prior to 11/18/21	Contaminants subject to order of magnitude - Final remediation documents issued between 6/2/08 and 11/17/21	Contaminant subject to order of magnitude - Final remediation documents issued between 6/2/08 and 3/18/18	Contaminant subject to order of magnitude - Final remediation documents issued prior to 3/19/18
Ethylbenzene	Benzaldehyde	1,1'-Biphenyl	Cyanide
Hexachlorocyclopentadiene - Residential Only	Butylbenzyl phthalate - Nonresidential Only		
	Caprolactam		
	Cobalt – Residential Only		

Order of Magnitude Contaminants
Soil Ingestion-Dermal and Soil Inhalation Exposure Pathways
Soil Remediation Standards

Contaminants subject to order of magnitude - Final remediation documents issued prior to 12/3/08	Contaminants no longer subject to order of magnitude
Bromomethane –Nonresidential Only	Bromodichloromethane
4-Chloroaniline	Chloroform
Dibromochloromethane	Chloromethane
Naphthalene	1,4-Dichlorobenzene
Nitrobenzene – Nonresidential Only	1,1-Dichloroethane
	Hexachlorocyclopentadiene – Nonresidential Only
	4-Methylphenol
	1,1,2,2-Tetrachloroethane – Nonresidential Only
	1,1,2-Trichloroethane

Test Your Knowledge

True or False:

Chloroform is no longer subject to an order of magnitude evaluation.

A. True

B. False

Test Your Knowledge

True or False:

Chloroform is no longer subject to an order of magnitude evaluation.

A. True

B. False

Order of Magnitude Protectiveness Evaluation Frequently Asked Questions

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Frequently Asked Questions

Q: When will the Department require the order of magnitude evaluation?

A: Sites or areas of concern with a Final Remediation Document that have a remedy using engineering and/or institutional controls (limited restricted and restricted use remedial actions)

- The person responsible for maintaining the engineering and/or institutional control must perform the order of magnitude evaluation **as part of the next remedial action protectiveness/biennial certification** pursuant to the Administrative Requirements for the Remediation of Contaminated Sites, N.J.A.C. 7:26C-7.7 through 7.9.

Frequently Asked Questions

Q: When will the Department require the order of magnitude evaluation?

A: Exception: If the next scheduled remedial action protectiveness/biennial certification occurs between May 17 and November 17, 2021, the order of magnitude evaluation can be conducted as part of the 2023 remedial action protectiveness/biennial certification.

Note: This applies only to the order of magnitude evaluation. All other aspects of the remedial action protectiveness/biennial certification will be required in 2021.

Frequently Asked Questions

Q: What remediation standards are subject to the order of magnitude evaluation?

A: An order of magnitude evaluation is conducted for every newly adopted remediation standard for a given exposure pathway that is more stringent by an order of magnitude or more compared to the prior remediation standard for the given exposure pathway.

Frequently Asked Questions

Q: How is an order of magnitude evaluation conducted for a limited restricted use or restricted use soils-only RAO when additional remediation is being conducted for ground water?

A: The evaluation is the same as for any other area of concern except that only soils would be evaluated for order of magnitude, regardless of whether additional remediation was being conducted at that area of concern for ground water.

Frequently Asked Questions

Q: Does an order of magnitude difference in a remediation standard for a contaminant automatically require additional remediation?

A: No, however, an evaluation is required. If the evaluation indicates that the proposed or implemented remedy remains protective, then no additional remediation is required.

Frequently Asked Questions

Q: Can the pre-2021 remediation standards (default and site-specific remediation standards) be used to demonstrate protectiveness of the remedial action?

A: The pre-2021 remediation standards (default and site-specific remediation standards) can be used to demonstrate protectiveness of the remedial action except for a newly adopted remediation standard for a given contaminant for a given exposure pathway that is more stringent by an order of magnitude or more compared to the prior remediation standard. Under this scenario, the new remediation standard must be used to determine the continued protectiveness of the remedial action.

Frequently Asked Questions

Q: Can a responsible party use a mixture of 2021 remediation standards and pre-2021 remediation standards in remediating a site or area of concern?

A: Yes, if the site or area of concern has:

1. a Department-approved RAWP or RAR, or an LSRP certified RAWP or RAR, submitted to the Department no later than November 17, 2021. The RAWP or RAR must be modified to indicate by contaminant and exposure pathway what remediation standards are being applied at the site or area of concern. **Note:** Newly adopted 2021 remediation standards subject to the order of magnitude provisions must be used to remediate the site.

or

Frequently Asked Questions

Q: Can a responsible party use a mixture of 2021 remediation standards and pre-2021 remediation standards?

2. been issued a final remediation document no later than November 17, 2021. The deed notice and remedial action permit must be modified to indicate by contaminant and exposure pathway what remediation standards are being applied at the site or area of concern. **Note:** Newly adopted 2021 remediation standards subject to the order of magnitude provisions must be used to remediate the site.

Frequently Asked Questions

Q: Is there a phase-in procedure for sites or areas of concern that are issued a final remediation document between May 17 and November 17, 2021?

A: Yes. If a site or area of concern is issued a final remediation document during this time period, the order of magnitude evaluation can be conducted pursuant to the Brownfield and Contaminated Site Remediation Act (Brownfield Act) at N.J.S.A. 58:10B-13e. **Note:** If the remedy requires a deed notice and remedial action permit, these must be in place prior to issuing the final remediation document. It will be necessary to submit an approvable soil remedial action permit application to the Department by **October 17, 2021**, to allow the Department time to review and approve the permit prior to the November 17, 2021 deadline. If an approvable remedial action permit is not submitted by that date, then an order of magnitude evaluation **cannot be conducted** pursuant to the Brownfield Act at N.J.S.A.58:10B-13e.

Frequently Asked Questions

Q: What are some protectiveness evaluation scenarios under various remedial actions for the MGW exposure pathway?

A: There are many site-specific scenarios. Some examples are:

- For historical ground water contamination, evidence of successful ground water remediation (including demonstration of decreasing ground water contaminant concentrations) could be used as a line of evidence that contaminant sources have been remediated.
- Use of compliance options such as immobile contaminants, SESOIL and SESOIL-ATD-123 modeling, and SPLP can be used to demonstrate that additional remediation is not required.

Frequently Asked Questions

Q: What are some protectiveness evaluation scenarios under various remedial actions for other exposure pathways?

A: Some examples are:

- If contaminated soil has been excavated, such excavation may have removed contaminants subject to the order of magnitude provision. If existing post excavation data show compliance with the new remediation standard, no additional remediation is required.
- If contaminated soil has been capped, contaminants subject to the order of magnitude provision may also be capped. If existing delineation data and areas that are capped demonstrate compliance with the new remediation standard, no additional remediation is required.

Frequently Asked Questions

Q: What are some protectiveness evaluation scenarios under various remedial actions for other exposure pathways? (continued)

A: Treatment systems such as Point of Entry Treatment System (POET) and Sub Slab Depressurization System (SSDS) designed for certain contaminants may work for other contaminants subject to the order of magnitude provision. If existing treatment data show compliance with the new remediation standard, no additional remediation is required.

Questions?

Thank You for Attending!

Please complete the Course Evaluation at:

https://www.surveymonkey.com/r/7WHTKYL