


INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT	STATUS: Effective	POLICY NUMBER: WASTE-0074-NPD	
AGENCY NONRULE POLICY DOCUMENT SUBJECT: <i>Supplemental Guidance on Engineered Exposure Controls</i>	AUTHORIZED: Bruno L. Pigott, Commissioner		
	SUPERSEDES: NEW	ISSUING OFFICE(S): Office of Land Quality, Science Services Branch	
	ORIGINALLY EFFECTIVE: December 10, 2021	RENEWED/REVISED: N/A	

Disclaimer: This Nonrule Policy Document (NPD) is being established by the Indiana Department of Environmental Management (IDEM) consistent with its authority under IC 13-14-1-11.5. It is intended solely to provide guidance and shall be used in conjunction with applicable rules or laws. It does not replace applicable rules and laws, and if it conflicts with these rules or laws, the rules or laws shall control. Pursuant to IC 13-14-1-11.5, this policy will be available for public inspection for at least 45 days prior to presentation to the appropriate State Environmental Board and may be put into effect by IDEM 30 days afterward. If the nonrule policy is presented to more than one board, it will be effective 30 days after presentation to the last. IDEM also will submit the policy to the Indiana Register for publication.

1.0 PURPOSE

This NPD identifies information resources for several engineering controls which provide a physical barrier to release-related chemicals, thus, eliminating or reducing exposure. Also, controls to reduce exposure to air concentrations or cutoff completed vapor intrusion pathways. Engineering controls are required for remedial actions and removal under IC 13-25-5-8.5, IC 13-11-2-185, and IC 13-11-2-187. Most barrier methods used, in specific situations, are mentioned in Appendices A to D. The appendices are not intended as a compendium of all engineering control methods and other methods may be approved as part of an approved remedial action.

2.0 SCOPE

This NPD applies to development, review, and use of proposed engineered system or barrier exposure controls for mitigation of release-related chemicals.

3.0 SUMMARY

This NPD identifies several engineering control methods including covers, fences, slurry walls, and vapor intrusion mitigation systems.

4.0 DEFINITIONS

- 4.1. "Agency" – The Indiana Department of Environmental Management (IDEM).
- 4.2. "Engineering control" – Physical barriers designed and maintained to prevent, humans or other receptors, exposure to contaminated environmental media.
- 4.3. "Nonrule policy" – The term assigned by the Indiana Department of Environmental Management (IDEM) to policies identified in IC 13-14-1-11.5 as any policy which: A. Interprets, supplements, or implements a statute or rule; B. Has not been adopted in compliance with IC 4-22-2; C. Is not intended by IDEM to have the effect of law; and D. Does not apply solely to the internal IDEM organization, an administrative policy.
- 4.4. "OLQ technical staff" – Positions requiring specialized knowledge pertaining to a particular occupation or field of study such as chemistry, geology, engineering, or risk assessment.

- 4.5. "Release-related chemical" – A substance placed on the land or in the subsurface which is, by virtue of its nature or quantity, subject to regulation by IDEM's Office of Land Quality. The term also includes regulated breakdown products.
- 4.6. "Remedy" – One or more measures taken to reduce risks to human health or the environment arising from a contaminant release. Measures may include contaminant treatment, contaminant removal, institutional controls, or engineered controls alone or in combination.

5.0 ROLES

- 5.1. Environmental consultants shall:
 - A. Use the engineering controls described to eliminate, control, or reduce exposure to release-related chemicals in environmental media.
- 5.2. OLQ technical staff shall:
 - A. Review proposed remedies involving plans for eliminating, controlling, or reducing exposure to release-related chemicals.
 - B. Make recommendations regarding the control method proposed by the consultant depending on the site-specific situation.

6.0 POLICY

- 6.1. Relevant control methods shall be reviewed and used, as applicable, for elimination or reduction of exposure to release-related chemicals. Various control methods are listed in Appendices A to D.
- 6.2. IDEM shall review the consultants' proposed control plans and remedy proposals.
- 6.3. IDEM shall evaluate the plans or proposals on their merits and make recommendations, depending on the site-specific situation.
- 6.4. The Appendices in this NPD should be used in conjunction with the Remediation Closure Guide, the Risk-based Closure Guide, or then-applicable current guidance.

7.0 REFERENCES

- 7.1. Indiana Statutes and Rules:
 - A. IC 13-11-2-185 Environment, Definitions, Remedial action
 - B. IC 13-11-2-187 Environment, Definitions, Removal
 - C. IC 13-25-5-8.5 Environment, Hazardous Substances, Voluntary Remediation of Hazardous Substances and Petroleum, Voluntary remediation work plan objectives; additional action to protect human health and the environment not necessary under certain circumstances; risk-based remediation objectives and proposals
- 7.2. Indiana Rules:
 - A. 329 IAC 10-2-174, [Indiana Administrative Code, Solid Waste Management Division, Article 10, Solid Waste Land Disposal Facilities](#), Definitions, "Solid waste".
- 7.3. Agency Policies:
 - A. Remediation Closure Guidance
https://www.in.gov/idem/cleanups/files/remediation_closure_guide.pdf.
- 7.2. Other Sources
 - Engineering Control: Covers
 - A. (USEPA 2001a) Operation and Maintenance in the Superfund Program, OSWER 9200.1-37FS EPA 540-F-01-004, May 2001, <https://semspub.epa.gov/work/HQ/176112.pdf>

- B. (USEPA 2001b) Geosynthetic Clay Liners Used in Municipal Solid Waste Landfills, OSWER, (5306W), EPA530-F-97-001, Revised December 2001, <https://semspub.epa.gov/work/HQ/176112.pdf>
- C. (USACoE 2001) US Army Corps of Engineers, CECW: Checklist for Hazardous Waste Landfill Cover Design, TL 1110-1-162, 06830 Sep 01, http://synectics.net/public/library/StreamResource.axd?DSN=pub&Mode=FileImage_Inline&ID=1040
- D. (IDEM 2012) Indiana Department of Environmental Management, Remediation Closure Guide, Nonrule Policy Document #0046-R1, March 22, 2012, https://www.in.gov/idem/files/nrpd_waste-0046-r1.pdf
- E. (INDOT 2022) Indiana Department of Transportation (INDOT), Standard Specifications sections 207, 301, 302, 401, 402, 408, 502, 506, and 507, 2018, <https://www.in.gov/dot/div/contracts/standards/book/sep21/2022%20Standard%20Specifications.pdf>
- F. (INDOT 2010) Indiana Department of Transportation (INDOT), FHWA/IN/JTRP 2010/01 Final Report, TREATMENT GUIDELINES FOR PAVEMENT PRESERVATION, January 2010, <https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=2618&context=jtrp>
- G. (MA DEP 2002) Guidance on the Use, Design, Construction, and Monitoring of Engineered Barriers, Public Comment Draft, Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup, Boston, MA, Nov. 2002, <https://www.mass.gov/doc/draft-guidance-on-the-use-design-construction-and-monitoring-of-engineered-barriers/download>
- H. (WI DNR 2014) Guidance on Soil Performance Standards, Wisconsin DNR PUB-RR-528, Wisconsin DNR, April 2014, <https://dnr.wi.gov/files/PDF/pubs/rr/RR528.pdf>
- I. (WI DNR 2013) Guidance for Cover Systems as Soil Performance Standard Remedies, Wisconsin DNR PUB-RR-709, January 2013, <https://dnr.wi.gov/files/PDF/pubs/rr/RR709.pdf>
- J. ASTM International, Standard Guide for Application of Engineering Controls to Facilitate Use or Redevelopment of Chemical-Affected Properties, ASTM E2435 - 05(2020), 1850 M Street, NW, Suite 1030, Washington, DC 20036
- K. AASHTO TP 64-03, Standard Method of Test for Prediction of Chloride Penetration in Hydraulic Cement Concrete by the Rapid Migration Procedure, 2003, American Association of State Highway and Transportation Officials, 444 North Capitol Street NW, Suite 249, Washington, D.C. 20001

Engineering Controls: Fences

- A. (US DoD 1993) Department of Defense, Military Handbook Design Guidelines for Security Fencing, Gates, Barriers and Guard Facilities; MIL-HDBK-1013/10, May 14, 1993, https://www.wbdg.org/FFC/NAVFAC/DMMHNAV/1013_1a.pdf
- B. (US DoD) Department of Defense: UFGS 32 31 13 Chain Link Fences and Gates, <https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/ufgs-32-31-13>
- C. (IDEM 2012) Indiana Department of Environmental Management, Remediation Closure Guide, Nonrule Policy Document #0046-R1, March 22, 2012, http://www.in.gov/idem/cleanups/files/remediation_closure_guide.pdf
- D. (ASTM International 2005), Standard Guide for Application of Engineering Controls to Facilitate Use or Redevelopment of Chemical-Affected Properties, E 2435-05, July 2005, ASTM International, 1850 M Street, NW, Suite 1030, Washington, DC 20036
- E. ASTM International Standard F567, Practice for Installation of Chain Link Fence, 1850 M Street, NW, Suite 1030, Washington, DC 20036

- F. (CLMIA 2009) Security Fencing Guidelines, Chain Link Manufacturers Institute, <https://chainlinkinfo.org/security-fencing-guidelines>

Engineering Controls: Slurry Walls

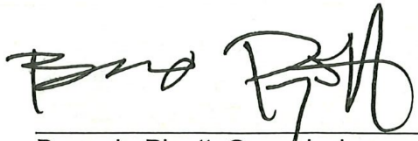
- A. (US EPA 1984) Slurry Trench Construction for Pollution Migration Control EPA-540-84-001, <http://cfpub.epa.gov/si/ntislink.cfm?dirEntryID=47752>
- B. (IDEM 2012) Indiana Department of Environmental Management, Remediation Closure Guide, Nonrule Policy Document #0046-R1, July 9, 2012, http://www.in.gov/idem/cleanups/files/remediation_closure_guide.pdf
- C. (API 2003) API Recommended Practice for Field Testing Water-based Drilling Fluids 13B-1, Third Edition, December 2003, ANSI/API 13B-1/ISO 10414-1, American Petroleum Institute 200 Massachusetts Avenue NW, Suite 1100, Washington, DC 20001-5571
- D. Ryan, C. and Spaulding, C; 2007; Vertical Groundwater Barriers for Contaminated site reclamation, Presented at the, Proceedings of the 10th Australia New Zealand Conference on Geo-Mechanics, Common Ground, Brisbane, Australia, <http://www.geo-solutions.com/resources/vertical-groundwater-barriers>
- E. Ryan, C, PE; Day, S.; Soil Bentonite Slurry Wall Specifications, Geo Solutions White Paper, <http://www.geo-solutions.com/resources/soil-bentonite-slurry-wall-specifications/>

Vapor Mitigation Systems

- A. (US EPA 2008) Engineering Issue, Indoor Air Vapor Intrusion Mitigation Approaches, EPA 600/r08115, <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100AE72.txt>
- B. (EPA 2009) Residential Air Cleaners, [A Technical Summary; Portable Air Cleaners, Furnace and HVAC Filters](#), EPA402-F-09-002
- C. (NAVFAC) Naval Facilities Engineering Command: Vapor Intrusion Mitigation in Construction of New Buildings Fact Sheet, <https://dnr.wi.gov/topic/Brownfields/documents/vapor/navfac.pdf>
- D. (NIST 2008) Standards Development for Gas Phase Air Cleaning Equipment in Buildings, NISTIR7525, National Institute of Standards and Technology, https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=861653
- E. (ANSI/AARST SGM-SF-2017 2017) Soil Gas Mitigation Standards for Existing Homes, <https://standards.aarst.org/SGM-SF-2017/4/#zoom=z>
- F. (ANSI/AARST RMS-MF-2018) Radon Mitigation Standards for Multifamily Buildings, <https://standards.aarst.org/RMS-MF-2018-X/3/index.html#zoom=z>
- G. (ANSI/AARST RMS-LB 2018) Radon Mitigation Standards for Schools and Large Buildings, <https://standards.aarst.org/RMS-LB-2018-X/index.html>
- H. Ash, James, Ensign, Mark and Simons, William, 2010; Sustainable Vapor Intrusion Controls – Designing an Effective Passive System, Proceedings of the Air & Waste Management Association's Vapor Intrusion 2010 Conference, 8 pages, 2010, <http://clu.in.org/download/contaminantfocus/vi/Sustainable%20vapor%20intrusion%20controls%20passive.pdf>
- I. Brodhead, William and Hatton, Thomas; High Vacuum, High Airflow Blower Testing and Design for Soil Vapor Intrusion Mitigation in Commercial Buildings, Proceedings of the Air & Waste Management Association' Vapor Intrusion 2010 Conference, 22 pages, 2010, Air & Waste Management Association, Koppers Building, 436 Seventh Avenue Suite 2100, Pittsburgh, PA 15219
- J. Folkes, David J; Design Effectiveness and Reliability of SubSlab Depressurization Systems for Mitigation of Chlorinated Solvent Vapor Intrusion: EnviroGroup Limited, presented in a series of EPA seminars on vapor intrusion at the roll-out of the 2002, draft OSWER guidance available at: [http://www.clu-in.org/download/contaminantfocus/vi/design%20effectiveness.pdf](http://www.clu.in.org/download/contaminantfocus/vi/design%20effectiveness.pdf)

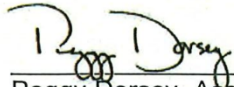
- K. (ITRC 2020) Vapor Intrusion Mitigation Training-fall/winter 2020, Interstate Technology and Regulatory Council, 1250 H Street NW, Suite 850, Washington DC, 20005, Training documents will be available here: <https://www.itrcweb.org/Team/Public?teamID=85>
- L. MacGregor, I., Prier, M, Rhoda, D, Dindal, A, and McKernan, J; 2011; Verification of Building Pressure Control as Conducted by GSI Environmental, Inc. for the Assessment of Vapor Intrusion: Environmental Technology Verification Report, ETV Advanced Monitoring Systems Center, 148 pages, <https://nepis.epa.gov/Adobe/PDF/P100ELXG.pdf>
- M. McAlary, T., et.al.; High Purge Volume Sampling –A New Paradigm for Subslab Soil Gas Monitoring, Ground Water Monitoring, & Remediation, v. 30, no. 2, Spring 2010, pp 73 – 85, National Ground Water Association, 601 Dempsey Road, Westerville, Ohio, 43081, <https://ngwa.onlinelibrary.wiley.com/doi/epdf/10.1111/j.1745-6592.2010.01278.x>
- N. McAlary, Todd, Bertrand, David, Nicholson, Paul, Wadley, Sharon, Rowlands, Danielle, Thrupp, Gordon and Ettinger, Robert; Geosyntec Consultants, Inc.;2011; Pneumatic Testing, Mathematical Modeling and Flux Monitoring to Assess and Optimize the Performance and Establish Termination Criteria for Sub-Slab Depressurization Systems, Presented at U.S. EPA Workshop on Vapor Intrusion AEHS Soil and Sediment Conference, San Diego, CA, March 15, 2011, Geosyntec Consultants, Inc. 9302 N. Meridian St. Suite 260, Indianapolis, IN 46260
- O. Sidheswaran, Meera A, Destailats, Hugo, Sullivan, Douglas P, Cohn, Sebastian, and Fisk, William J, 2012; Energy Efficient Indoor VOC Air Cleaning with Activated Carbon Fiber (ACF) Filters, Building and Environment Volume 47 pp 368-372, <https://www.sciencedirect.com/science/article/abs/pii/S0360132311002101>

8.0 SIGNATURES



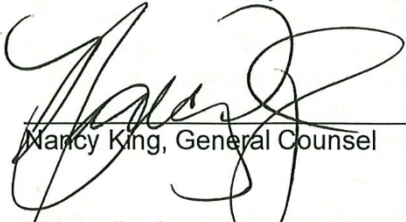
Bruno L. Pigott, Commissioner
Indiana Department of Environmental Management

6/18/21
Date



Peggy Dorsey, Assistant Commissioner
Office of Land Quality

6/1/2021
Date



Nancy King, General Counsel

6/8/21
Date

This policy is consistent with agency requirements.



Quality Assurance Program
Office of Program Support
Indiana Department of Environmental Management

21 Jun 2021
Date

9.0 APPENDICES

A. Covers

https://www.in.gov/idem/cleanups/files/engineering_controls_covers.pdf

B. Fences

https://www.in.gov/idem/cleanups/files/engineering_controls_fences.pdf

C. Slurry Walls

https://www.in.gov/idem/cleanups/files/engineering_controls_slurry_walls.pdf

D. Vapor Intrusion Mitigation Systems

https://www.in.gov/idem/cleanups/files/remediation_tech_guidance_vapor_mitigation.pdf