EPA Federal Facilities Superfund Program – RPM Bulletin 2021-05 EPA-recommended Toxicity Values and Attenuation Factors for TCE and Vapor Intrusion

9 August 2021

Purpose:

The purpose of this document is to explain EPA expectations regarding the evaluation of risk associated with vapor intrusion under CERCLA response actions and RCRA corrective actions at Federal Facility sites. This bulletin addresses the use of OSHA occupational permissible exposure limits (PELs), and the selection of toxicity values and attenuation factors, based on existing EPA guidance, to screen for and assess risks due to trichloroethene (TCE) vapor intrusion. In so doing, this document concisely addresses positions taken and expressed by representatives of the U.S. Department of Defense (DoD), in the context of CERCLA response actions and RCRA corrective actions for TCE vapor intrusion at certain federal facilities that are subject to a federal land cleanup program.

Existing Guidance:

U.S. Environmental Protection Agency (EPA). 2015. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air (OSWER Publication 9200.2-154). Office of Solid Waste and Emergency Response. June. https://www.epa.gov/sites/default/files/2015-09/documents/oswer-vapor-intrusion-technical-guide-final.pdf

U.S Environmental Protection Agency. 2014a. *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors.* (OSWER Directive 9200.1-120). Office of Solid Waste and Emergency Response. February. <u>https://www.epa.gov/sites/default/files/2015-11/documents/oswer_directive_9200.1-</u> 120 exposurefactors corrected2.pdf

U.S. Environmental Protection Agency (EPA). 2014b. *Compilation of Information Relating to Early/Interim Actions at Superfund Sites and the TCE IRIS Assessment*. Memorandum from Robin Richardson. Office of Superfund Remediation and Technology Innovation, Washington, D.C. August 27. <u>https://semspub.epa.gov/work/HQ/174044.pdf</u>

U.S. Environmental Protection Agency (EPA). 2003. *Human Health Toxicity Values in Superfund Risk Assessments*. OSWER Directive 9285.7-53. December 5. https://www.epa.gov/sites/default/files/2015-11/documents/hhmemo.pdf

U.S. Environmental Protection Agency (EPA). 1991. *Risk Assessment Guidance for Superfund* (*RAGS*), *Volume I: Human Health Evaluation Manual (Part C, Risk Evaluation of Remedial Alternatives)*, *Interim.* Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01C. October. <u>https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part-c</u>

Summary:

1. EPA has established guidance on how to select toxicity values and attenuation factors for use in vapor intrusion screening and risk assessment.

2. EPA expects that this guidance will be used within the context of all federal land cleanup programs, including federal facilities subject to cleanups under CERCLA and RCRA.

Background:

OSHA PELs, Toxicity Values and CERCLA

The EPA and the Occupational Safety and Health Administration (OSHA) of the Department of Labor each have a distinct statutory responsibility to ensure the safety and health of America's workforce through the timely and effective implementation of a number of federal laws and implementing regulations (EPA, 2015). The OSHA TCE PEL applies to industrial workers actively using TCE; it does not apply to industrial workers being exposed to TCE from sub slab vapor intrusion. OSHA also does not apply to adjacent workers, such as administrative staff, who may be exposed to TCE. The contribution of sub slab TCE is determined based on CERCLA vapor intrusion guidance, such as using the vapor intrusion screening level (VISL) calculator (available at https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator). Where ongoing operational use of TCE occurs co-located with TCE vapor intrusion subject to CERCLA or RCRA actions, the project team may need to consult regional management or EPA HQ to determine whether and how to reconcile ongoing operational uses of TCE with response action or corrective action to address TCE vapor intrusion concerns.

At various times and, at some facilities, the Navy has stated that the OSHA PELs should be applied for determining risks to non-residential building occupants via vapor intrusion. DOD developed a process to derive an occupational exposure level (OEL) for TCE, documented in a draft report entitled Trichloroethylene: Occupational Exposure Level for the Department of Defense (Sussan et al., 2019).¹ More recently, DOD has advocated and urged the use of its draft OEL for TCE for purposes of supporting risk management decisions for vapor intrusion in nonresidential buildings at certain federal facilities where TCE is a sub-surface contaminant. EPA does not use draft toxicity or screening level values to assess potential risks at CERCLA or RCRA sites. Moreover, EPA has established a hierarchy for the selection of toxicity values, with Tier 1 values, developed under EPA's Integrated Risk Information System (IRIS), being the preferred values (EPA, 2003). There is currently a Tier 1 toxicity value available for TCE; once finalized, the DOD OEL may be evaluated as a potential Tier 3 value, which is less preferred, and generally not used when there is a Tier 1 value available. Note that the National Academies of Sciences, Engineering and Medicine recently peer reviewed the draft OEL and identified a number of flaws and weaknesses. At this time, the DOD has not yet finalized the OEL, so we do not know if or how these issues have been addressed.

¹ Occupational exposure for ongoing operational use of TCE is different from VI exposure and should be carefully examined at CERCLA and RCRA sites.

Attenuation Factors for Screening and Risk Assessment

We also have examples of federal facilities arguing against the use of default attenuation factors when screening sites for potential vapor intrusion issues. For example, the Navy has proposed applying a Navy-derived default attenuation factor of 0.001 for screening indoor air concentrations at industrial buildings from detected sub-slab concentrations because they believe EPA's attenuation factor is not representative for industrial buildings and is too conservative. The Navy's position is outlined in their document, *A Quantitative Decision Framework for Assessing Navy Vapor Intrusion Sites* (June 2015). The Navy's proposed default AF of 0.001 for screening indoor air concentrations is not consistent with the AF_{sub-slab} specified in the OSWER VI guidelines; this bulletin recommends consistency with the OSWER VI guide in the application of the EPA AF of 0.03 when estimating indoor air concentrations from sub-slab concentrations.

Expectations:

Federal Facilities are obligated under CERCLA to follow EPA guidelines, rules, regulations and criteria. While RCRA does not have similar language, if another federal agency is following the CERCLA process under RCRA, they have an obligation to follow the CERCLA process regarding the use of EPA guidelines. In addition, most Federal Facility Agreements contain language that requires compliance with EPA guidance.

OSHA PELs, Toxicity Values and CERCLA

EPA's expectations regarding the use of OSHA PELs are clearly laid out in existing guidance that was vetted years ago with the Office of Management and Budget and has since been applied consistently by EPA. Specifically, assessments of vapor intrusion should not rely on OSHA's PELs for use at CERCLA and RCRA corrective action sites.

"EPA does not recommend using OSHA's PELs (or TLVs) for purposes of assessing human health risk posed to workers (EPA 1991c, Appendix C) by the vapor intrusion pathway or supporting final 'no-further-action' determinations for vapor intrusion arising in nonresidential buildings", per Section 7.4.3 of the *OSWER Technical Guide For Assessing And Mitigating The Vapor Intrusion Pathway From Subsurface Vapor Sources To Indoor Air* (OSWER Publication 9200.2-154; June 2015; "*OSWER VI Guide*"), which "is intended for use at any site (and any building or structure on a site) being evaluated by EPA pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or the corrective action provisions of the Resource Conservation and Recovery Act (RCRA), EPA's brownfield grantees, or state agencies acting pursuant to CERCLA or an authorized RCRA corrective action program where vapor intrusion may be of potential concern."

EPA expects that vapor intrusion risk assessments will use toxicity values based on EPA's established hierarchy of sources, in which IRIS values representing the first tier, and preferred

source of toxicity values. Use of a draft Tier 3 value in lieu of the IRIS Tier 1 value would go against established EPA guidance.

"EPA generally recommends that a human health risk assessment be conducted to determine whether the potential human health risk posed to building occupants by a complete or potentially complete vapor intrusion pathway are within or exceed acceptable levels, consistent with applicable statutes and considering EPA guidance", per section 7.4 of the *OSWER VI Guide*. For purposes of human health risk assessment, "EPA recommends that inhalation toxicity values be selected considering OSWER's hierarchy of sources (EPA 2003)", per section 7.4 of the *OSWER VI Guide*. Currently, the recommended inhalation toxicity values for TCE considering the recommended hierarchy of sources are the non-cancer inhalation reference concentration and inhalation unit risk published in EPA's Integrated Risk Information System (IRIS) in September 2011.

Attenuation Factors for Screening and Risk Assessment

Estimations of indoor air concentrations are performed by applying attenuation factors to groundwater or sub-slab concentrations. EPA (2015) specifies the application of default attenuation factors for screening purposes as follows:

"These recommended values [Appendix A] are proposed to apply to all vaporforming chemicals for use in estimating potential upper-bound concentrations in indoor air that may arise from vapor intrusion." And

"The risk-based, indoor air screening levels ($C_{target,ia}$) are calculated according to the guidance provided in *Risk Assessment Guidance for Superfund (RAGS) Part F* (EPA 2009) as implemented in EPA's Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites" (e.g., see https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables²).

For TCE, the recommended default attenuation factor of 0.03 should be used to estimate indoor air concentrations from detected sub-slab concentrations for vapor intrusion screening (EPA, 2015). This is important because screening level attenuation factors are meant to be used to estimate a potential upper-bound indoor air concentration that may arise from vapor intrusion. Use of the Navy Vapor Intrusion Decision Framework contradicts established EPA guidance.

While the use of site-specific attenuation factors can be considered for use in baseline risk assessments, the Navy default attenuation factor is not, in fact, a site-specific value.

In working with other Federal agencies to investigate, characterize, and assess human exposures and health risks posed by TCE contamination at sites where another Federal agency is the lead

² Link updated from original.

for cleanup, EPA Regions should use the existing guidelines, criteria and principles highlighted in this document to the same extent as at non-federal sites.³

Actions and Options for EPA Reviewers:

- 1. EPA RPMs and risk assessors should alert their respective managers if and when DoD representatives state their intention to use of OELs *in lieu* of EPA-recommended toxicity values, or intention to use Navy-derived default attenuation factors.
- 2. EPA human health risk assessors should continue to use recommended sources of inhalation toxicity values, and default screening level attenuation factors for TCE and exposure factors for non-residential exposure scenarios.

Citations

National Academies of Sciences, Engineering, and Medicine (NAS). 2019. Review of DOD's Approach to Deriving an Occupational Exposure Level for Trichloroethylene. Washington, DC: The National Academies Press. <u>https://doi.org/10.17226/25610</u>.

Sussan, T.E., G.J. Leach, T.R. Covington, J.M. Gearhart, and M.S. Johnson. 2019. Trichloroethylene: Occupational Exposure Level for the Department of Defense. January 2019. U.S. Army Public Health Center, Aberdeen Proving Ground, MD.

³ For Federal facilities on the National Priority List, CERCLA Section 120(e)(4)(A) provides a role for EPA in the selection of remedies. Section 120(a)(2) of CERCLA provides as follows:

[&]quot;(2) Application of requirements to federal facilities. --- All guidelines, rules, regulations, and criteria which are applicable to preliminary assessments carried out under this Act for facilities at which hazardous substances are located, applicable to evaluations of such facilities under the National Contingency Plan, applicable to inclusion on the National Priority List, or applicable to remedial actions at such facilities shall also be applicable to facilities which are owned or operated by a department, agency, or instrumentality of the United States in the same manner and to the extent as such guidelines, rules, regulations, and criteria are applicable to other facilities. No department, agency, or instrumentality of the United States may adopt or utilize any such guidelines, rules, regulations, or criteria which are inconsistent with the guidelines, rules, regulations, or criteria established by the Administrator under this Act."