

Superfund Technical Review Workgroup (TRW) – Bioavailability Committee 2025 Accomplishments

The Technical Review Workgroup Bioavailability Committee (TRW-BAC) develops new guidance concerning human health risk assessment at hazardous waste sites. The TRW-BAC also provides site consultation in support of regional requests and identifies research needs to address data gaps relevant to contaminant bioavailability in soil site assessment activities.

Technical Support

One of the fundamental roles and responsibilities of the TRW-BAC is to provide technical support to state, federal, tribal, non-governmental and international groups regarding the assessment of relative bioavailability (RBA) and its application to human health risk assessment. Furthermore, the TRW-BAC promotes the application of best use of available scientific information concerning RBA and human health risk assessment methods in soil and soil-like (e.g., floodplains) media at affected sites.

The TRW-BAC members are technically diverse, experienced, and highly trained professionals in chemistry, toxicology, and human health risk assessment, and provide expert assistance in complex risk assessment scenarios.

The TRW-BAC responded to a total of seven requests in 2025: three requests for assistance from EPA Regions and four from US risk assessment/soil remediation consultants. Requests were for the following information:

1. Assisted EPA Region 6 in reviewing a proposal to establish a site-wide RBA of PCCD/F in soils at the Houston Wood Preserving Works site.
2. Responded to a query from EPA Region 5 regarding averaging of RBA measured at more than one sample depth.
3. Responded to a query from EPA Region 5 regarding use of Balstox215 for reducing bioavailability of lead in soil.
4. Responded to a query submitted by a US consultant about the risk implications of an RBA of 15% for arsenic in soil at a historic orchard site in Western New York.
5. Responded to a query from a US consultant for a list of contract laboratories certified to conduct Method 1340 for arsenic IVBA.
6. Responded to a query from a US consultant regarding applications of RBA-adjusted concentrations in decisions regarding disposal of arsenic contaminated soils.
7. Responded to a query from a US consultant on establishing bioavailability testing for lead and arsenic in soil in their laboratory.

Methods and Tools Development

The TRW-BAC has continued to develop the Bioavailability Sampling Planning and Evaluation Tool (BSPET) to support the 2021 Bioavailability Sampling Guidance (Guidance for Sample Collection for In Vitro Bioaccessibility Assay for Arsenic and Lead in Soil and Applications of

Relative Bioavailability Data in Human Health Risk Assessment). The tool uses statistical simulation techniques to predict false compliance and false exceedance decision error probabilities expected from user selected sampling plans. The tool can be used to develop sampling plans that meet sampling Data Quality Objectives (DQOs) and to evaluate results to determine if DQOs were achieved as recommended in the 2006 DQO Guidance (Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA/240/B-06/001). In 2025, a manuscript describing a framework for application of tool was published (Nelson et al. 2025, *Estimating accuracy and precision in the bioavailability-adjusted exposure point concentration to support human health risk assessment of lead-contaminated soil*) and the tool was extended to enable sample planning for estimation of a site-wide RBA.

The TRW-BAC is in the process of updating Method 1340 in the SW846 Test Methods Compendium. This update will formally add arsenic to the method, as well as provide updated concentrations for new standards.

The TRW-BAC is developing and refining the mouse RBA assays for arsenic and lead and research on soil amendments for permanently reducing arsenic and lead bioavailability. The TRW-BAC completed a study of interlaboratory performance of the mouse lead RBA assay and members of the TRW-BAC submitted a manuscript for publication that presents the results of the study (Bradham et al., *Evaluation of Performance of a Mouse Assay to Estimate the Oral Relative Bioavailability of Lead in Soils and Dusts*). Finally, the TRW-BAC developed plans for field studies of jarosite applications for decreasing lead RBA in 2026.

Communication, Training, and Outreach

Presented two training sessions to the TRW-BAC on *DQOs to Inform Sample Planning When Using a Sitewide RBA*.

Finalized and posted two technical memos that provide an overview of the mouse RBA model and two fact sheets that explain bioavailability concepts to the general public (<https://www.epa.gov/superfund/soil-bioavailability-superfund-sites-guidance#metals>)

1. *Mouse Model for Measuring In Vivo Inorganic Arsenic Oral Relative Bioavailability*
2. *Mouse Model for Measuring In Vivo Lead Oral Relative Bioavailability*
3. *Bioavailability 101: Arsenic in Soil*
4. *Bioavailability 101: Lead in Soil*

Patents, Publications, and Presentations

TRW-BAC members also published one paper in peer-reviewed journals (two papers in journal review) and participated in eight presentations at national and international scientific meetings.

Blackmon MD, Sowers TD, Jerden ML, Jiang C, Bradham KB. (2024) Jarosite-based remediation of Pb/As contaminated soils: assessing the potential for grass growth and long-term efficacy. In journal review.

Bradham K, Diamond G, Nelson C, Thomas D, Sowers T, Blackmon M. (2025) Evaluation of performance of a mouse assay to estimate the oral relative bioavailability of lead in soils and dusts. Accepted for publication in J Toxicol Environ Health Part A.

Nelson C, Li K, Diamond G, Lambert M, Bradham K. (2026) Estimating accuracy and precision in the bioavailability-adjusted exposure point concentration to support human health risk assessment of lead-contaminated soils. J Toxicol Environ Health A 89(2):79-93.

Scheckel KG. (2025) Transformation of soil lead and arsenic to low bioavailability phases in situ: connecting geochemistry and human health risk assessment to limit exposure. EPA Engineering Forum, December 3, 2025 (oral).

Scheckel K, Bradham K, Sowers T, Noerpel M, Betts A, Luxton T, Blackmon M. (2025) EPA-ORD's soil Pb remediation & bioavailability testing for site-specific adjustments. Invited presentation for 2025 Laboratory Enterprise, June 3, 2025 (oral). STICS ORD-067083.

Scheckel K, Bradham K, Sowers T, Noerpel M, Betts A, Luxton T, Blackmon M. (2025) EPA-ORD's soil Pb remediation & bioavailability testing for site-specific adjustments. Invited briefing for OCSPP, April 14, 2025 (oral).

Sowers TD, Blackmon MD, Betts AR, Noerpel MR, Luxton TP, Lambert M, Partridge C, Bradham KD, Scheckel KG. (2025) Lead and arsenic conversion into low bioavailability jarosite family minerals using in situ techniques. "NARPM Presents..." EPA webinar, December 11, 2025 (oral).

Sowers TD, Blackmon MD, Betts AR, Noerpel MR, Luxton TP, Lambert M, Partridge C, Bradham KD, Scheckel KG. (2025) Transformation of soil lead and arsenic to low bioavailability phases in situ: connecting geochemistry and human health risk assessment to limit exposure. EPA Engineering Forum, December 3, 2025 (oral).

Sowers TD. (2025) X-ray absorption spectroscopy: Atomic insights driving solutions to environmental challenges. EPA Watershed and Ecosystem Characterization Division seminar, April 2, 2025 (oral).

Sowers TD, Blackmon MD, Noerpel MR, Betts AR, Luxton TP, Scheckel KG, Bradham KD. (2025) ORD Research Update: Current state of jarosite-based soil amendments, EPA Regions and Office of Land and Emergency Management, March 25, 2025 (oral).

Sowers TD, Fischel MHH, Peel HR, Fischel JST, Betts AR, Bone SE. (2025) Advances in metal(loid) in situ soil remediation and potential influences of changing environmental conditions. Advances in Agronomy. Invited chapter.

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