



# MEMORANDUM

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Re: Highway 24 Mill Preliminary Remediation Goals

Date: December 18, 2024

## Executive Summary

This technical memorandum documents the calculation of site-specific residential risk-based Preliminary Remediation Goals (PRGs) for lead at the Highway 24 Mill site in Colorado Springs (Site). The calculation of lead PRGs was triggered by sampling events in 2022 and 2023 which found that unacceptable risks to lead are present at the Site. These PRGs incorporate recently updated residential lead guidance from the U.S. Environmental Protection Agency (USEPA 2024a).

Final cleanup levels take into account not only risk-based PRGs to assess protectiveness, but also the remaining eight criteria contained in the National Contingency Plan (40 CFR 300.430(e)(9)). Background concentrations of soil lead, both geogenic and anthropogenic, may also impact achievable cleanup levels. Therefore, the final selected cleanup level may differ from the PRGs documented in this technical memorandum.

## Purpose and Background:

The purpose of this document is to derive site-specific PRGs for arsenic and lead at the Site. The Site consists of a mobile home park constructed adjacent to a former tailings pile associated with the Golden Cycle Mill and Gold Hill Tailings Site.

In 2022, the Superfund Technical Assessment and Response Team (START) collected samples from the mobile home park to assess the levels of metals in soil. Soil from 93 lots within the mobile home park (including 77 mobile homes, 1 office, 14 common areas, and one vacant lot) were collected at two depths: the top 0 to 1 inches and 1 to 6 inches below ground surface. Samples were analyzed for 23 Target Analyte List metals including mercury (Tetra Tech 2024).

In 2023, the START team conducted additional sampling to assess whether historical contamination from the former Golden Cycle Mill smokestack emissions and associated tailings pile extend beyond the



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mobile home park and to identify background levels of metals for the site. Sampling activities were conducted at 32 locations within 3 miles of the former Golden Cycle Mill. Samples were taken at 31 public properties (such as parks, open spaces, and recreational areas) and one commercial property. Soil samples were collected at two depth intervals: the top 0 to 1 inches and 1 to 6 inches below ground surface. Samples were analyzed for total recoverable metals (TRM) and mercury (Tetra Tech 2024).

A screening level assessment of site data identified lead and arsenic as the primary risk drivers at the site. The PRGs for arsenic and lead were derived for reasonable maximum exposures for residents of the mobile home park using site-specific bioavailability data.

## Sampling Results Summary:

Summary statistics on the concentrations of arsenic and lead from samples taken during the 2022 sampling event at lots within the mobile home park are shown below in Table 1. The concentrations of arsenic in all samples ranged from 15 mg/kg to 140 mg/kg with an average concentration of 53.8 mg/kg. The concentrations of lead in all samples ranged from 48 mg/kg to 700 mg/kg with an average concentration of 224.5 mg/kg.

**Table 1. A-1 Site Sampling Results for Arsenic and Lead**

Analyte	Depth (in inches)	Number of samples	Minimum (in mg/kg)	Mean (in mg/kg)	Maximum (in mg/kg)
Arsenic	All	186	15	53.8	140
	0-1	93	19	52.6	100
	1-6	93	15	54.9	140
Lead	All	186	48	224.5	700
	0-1	93	50	213.3	640
	1-6	93	48	235.6	700

Note: For lots with duplicate or triplicate samples, the maximum value was used to calculate statistics. mg/kg = milligram per kilogram

## Relative Bioavailability for Lead and Arsenic:

Relative bioavailability (RBA) is the amount of lead and arsenic that is absorbed into the body from exposure to contaminated soil. The default RBA value for both contaminants is 60%, meaning that 60% of arsenic and lead are assumed to be absorbed into the body from incidental ingestion of soil.

However, the RBA values of arsenic and lead in soil at many sites across Colorado are highly variable depending on the geology and source of contamination. Site-specific RBA evaluations can be used to



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improve the accuracy of the PRG calculations at a site. The *in vitro* bioaccessibility assay (IVBA) provides a rapid and relatively inexpensive alternative to *in vivo* assays for predicting relative bioavailability (RBA) (USEPA 2007). Once the site-specific IVBA has been determined, a conversion factor is used to calculate the RBA.

Soil samples from 15 lots were selected for IVBA to predict RBA at the site. These samples were submitted to ALS Environmental in Kelso, Washington for bioavailability testing in accordance with EPA Method 1340/6020A (Tetra Tech 2023). The currently preferred models for predicting RBA from IVBA for lead (USEPA 2007) and arsenic (Diamond et al., 2016; USEPA 2017) are:

Equation 1.  $RBA_{\text{lead}} = (0.88 \cdot IVBA) - 0.028$  ( $R^2 = 0.92$ )

Equation 2.  $RBA_{\text{arsenic}} = (0.79 \cdot IVBA) + 0.03$  ( $R^2 = 0.87$ )

where RBA and IVBA are expressed as fractions (not percentages).

The bioaccessibility of lead from the site soil samples ranged from 3-42% with a mean IVBA of 15%. This corresponds to a calculated RBA of <1-34%. The 95% upper confidence level (UCL) on the mean IVBA results is 21% with a corresponding RBA of 15.5%. Due to the large variance in the IVBA results, the 95% UCL value of 15.5% RBA was selected for use in the PRG calculation for lead.

The bioaccessibility of arsenic from the site soil samples ranged from 7-18% with a mean IVBA of 13%. This corresponds to a calculated RBA of 8-17%. The 95% upper confidence level (UCL) on the mean IVBA results is 14.3% with a corresponding RBA of 14%. Due to the large variance in the IVBA results, the 95% UCL value of 14.3% RBA was selected for use in the PRG calculation for arsenic.

### Integrated Exposure Uptake Biokinetic Modeling for Lead PRGs:

The EPA evaluates risks from lead using a different approach than for other contaminants. Lead exposure can cause a range of adverse health effects in humans. Studies of lead exposures and resultant health effects in humans have traditionally been described in terms of blood lead levels (BLL). Effects on the nervous system are well documented even at very low BLL (ATSDR 2020). Lead is widespread in the environment and exposure can occur from many different sources. Thus, PRGs based upon lead risks usually consider total exposure from all sources rather than just Site-related sources. Lead exposures and risks are typically assessed by comparing a model-calculated BLL for hypothetical populations to policy-based BLL targets of potential health concern.

The EPA recommends the use of the Integrated Exposure Uptake Biokinetic (IEUBK) model to evaluate exposures from lead-contaminated media for children in a residential setting (USEPA 1994a,b; 1998). The IEUBK model is updated periodically as new information and data about the toxicokinetics of lead and input parameters become available. The model available at the time of this memorandum is [Version 2, Build 1.72](#). The IEUBK model can be used to predict blood lead concentrations in exposed individuals and to estimate the probability of a blood lead concentration exceeding a target BLL.

The current blood lead reference value is 3.5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), which was updated from 5  $\mu\text{g}/\text{dL}$  in 2021 (CDC 2024). The PRGs shown in Table 2 are based on the probability of no more than a 5% of children at the site exceeding a target BLL of 3.5 or 5  $\mu\text{g}/\text{dL}$ .



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**Table 2. Site Screening Level Values for Lead (RBA set at 15.5%)**

Target Blood Lead Level	Screening Level for 12-72 month age group (in mg/kg)
3.5 µg/dL	142 ( <b>68</b> )
5 µg/dL	333 ( <b>20</b> )

NOTE: number in (**Bold**) indicates the number of lots with sample data exceeding the site screening level value for lead. RBA = Relative Bioavailability, BLL = Blood Lead Level in children ages 12-72 months, mg/kg = milligram per kilogram, µg/dL= micrograms per deciliter

## Arsenic Preliminary Remediation Goals

Site specific RBA values were inserted into the EPA RSL calculator to derive the PRGs for arsenic. Arsenic is a carcinogen, and the estimated screening levels are based on the target cancer risk level of 1E-04, a non-cancer Hazard Quotient (HQ) of 1, and a non-cancer HQ of 3 (Table 3).

**Table 3. Site Soil Screening Level Values for Arsenic (RBA set at 14.3%)**

Arsenic Screening Level based on Non-cancer Child HQ = 1 (in mg/kg)	Arsenic Screening Level based on Non-cancer Child HQ = 3 (in mg/kg)	Arsenic Screening Level based on Cancer Risk at 1E-04 Theoretical Risk (in mg/kg)
109 ( <b>6</b> )	327 ( <b>0</b> )	203 ( <b>0</b> )

NOTE: number in (**Bold**) indicates the number of lots with sample data exceeding the site screening level value for lead. RBA = Relative Bioavailability, HQ = Hazard Quotient, mg/kg = milligram per kilogram

## Conclusions:

At a target blood lead level of 3.5 µg/dL, removal actions would be advised at 68 of the 93 lots. At a target blood lead level of 5 µg/dL, removal actions would be advised at 20 of the 93 lots. For arsenic at the non-cancer Hazard Quotient of 1, removal actions would be advised at 6 of the 93 lots. At these six lots, clean up would also be necessary for lead at both target blood lead levels, and it is assumed that remedial action for lead would also address arsenic contamination. In addition, no action is necessary for arsenic at the non-cancer Hazard Quotient of 3 or cancer risk level of E-04 as no lots had arsenic levels above those PRGs.



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**Attachment Table 1. Decision Unit Comparison of Selected PRGs**

Lot	Arsenic		Lead		
	Concentration (mg/kg)	HQ= 1	Concentration (mg/kg)	TBLL of 3.5 (ug/dL)	TBLL of 5 (ug/dL)
GS-01A-00-01	29		110		
GS-01A-01-06	24		97		
GS-01B-00-01	46		230	X	
GS-01B-01-06	25		110		
GS-01E-00-01	54		180	X	
GS-01E-01-06	45		180	X	
GS-02A-00-01	24		91		
GS-02A-01-06	26		110		
GS-02B-00-01	43		130		
GS-02B-01-06	37		110		
GS-02E-00-01	47		170	X	
GS-02E-01-06	79		280	X	
GS-03A-00-01	35		120		
GS-03A-01-06	41		120		
GS-03B-00-01	44		160	X	
GS-03B-01-06	56		240	X	
GS-03E-00-01	44		180	X	
GS-03E-01-06	48		270	X	
GS-04A-00-01	30		100		
GS-04A-01-06	27		79		
GS-04B-00-01	75		250	X	
GS-04B-01-06	55		220	X	
GS-04E-00-01	46		180	X	



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Lot	Arsenic		Lead		
	Concentration (mg/kg)	HQ= 1	Concentration (mg/kg)	TBLL of 3.5 (ug/dL)	TBLL of 5 (ug/dL)
GS-04E-01-06	44		190	X	
GS-05A-00-01	31		120		
GS-05A-01-06	24		100		
GS-05B-00-01	53		190	X	
GS-05B-01-06	55		190	X	
GS-06A-00-01	19		61		
GS-06A-01-06	17		60		
GS-06B-00-01	50		180	X	
GS-06B-01-06	56		220	X	
GS-06E-00-01	37		140		
GS-06E-01-06	70		260	X	
GS-07A-00-01	22		80		
GS-07A-01-06	19		77		
GS-07A1-00-01	22		88		
GS-07A1-01-06	18		63		
GS-07B-00-01	56		210	X	
GS-07B-01-06	60		250	X	
GS-07E-00-01	54		240	X	
GS-07E-01-06	110	X	430	X	X
GS-08A-00-01	25		100		
GS-08A-01-06	15		54		
GS-08B-00-01	79		440	X	X
GS-08B-01-06	97		460	X	X
GS-08E-00-01	48		190	X	



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Lot	Arsenic		Lead		
	Concentration (mg/kg)	HQ= 1	Concentration (mg/kg)	TBLL of 3.5 (ug/dL)	TBLL of 5 (ug/dL)
GS-08E-01-06	68		240	X	
GS-09B-00-01	79		360	X	X
GS-09B-01-06	99		460	X	X
GS-09E-00-01	53		260	X	
GS-09E-01-06	79		380	X	X
GS-10B-00-01	99		430	X	X
GS-10B-01-06	110	X	580	X	X
GS-11B-00-01	96		490	X	X
GS-11B-01-06	120	X	610	X	X
GS-11D-00-01	25		92		
GS-11D-01-06	33		150	X	
GS-12B-00-01	63		340	X	X
GS-12B-01-06	92		570	X	X
GS-12D-00-01	37		180	X	
GS-12D-01-06	43		240	X	
GS-13B-00-01	60		290	X	
GS-13B-01-06	72		490	X	X
GS-13D-00-01	61		290	X	
GS-13D-01-06	52		230	X	
GS-14B-00-01	72		460	X	X
GS-14B-01-06	73		460	X	X
GS-14D-00-01	42		190	X	
GS-14D-01-06	42		200	X	
GS-15B-00-01	44		200	X	



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Lot	Arsenic		Lead		
	Concentration (mg/kg)	HQ= 1	Concentration (mg/kg)	TBLL of 3.5 (ug/dL)	TBLL of 5 (ug/dL)
GS-15B-01-06	56		220	X	
GS-16B-00-01	46		180	X	
GS-16B-01-06	65		250	X	
GS-16B1-00-01	35		92		
GS-16B1-01-06	24		79		
GS-16D-00-01	35		150	X	
GS-16D-01-06	37		180	X	
GS-17B-00-01	47		160	X	
GS-17B-01-06	42		150	X	
GS-17D-00-01	44		160	X	
GS-17D-01-06	55		210	X	
GS-18B-00-01	32		110		
GS-18B-01-06	36		120		
GS-18D-00-01	43		170	X	
GS-18D-01-06	28		130		
GS-19B-00-01	49		190	X	
GS-19B-01-06	30		110		
GS-20B-00-01	24		85		
GS-20B-01-06	33		130		
GS-20D-00-01	48		200	X	
GS-20D-01-06	34		120		
GS-21D-00-01	65		640	X	X
GS-21D-01-06	140	X	500	X	X
GS-22D-00-01	49		160	X	





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Lot	Arsenic		Lead		
	Concentration (mg/kg)	HQ= 1	Concentration (mg/kg)	TBLL of 3.5 (ug/dL)	TBLL of 5 (ug/dL)
GS-22D-01-06	47		180	X	
GS-23D-00-01	58		260	X	
GS-23D-01-06	48		190	X	
GS-24D-00-01	48		140		
GS-24D-01-06	46		180	X	
GS-25D-00-01	50		200	X	
GS-25D-01-06	58		240	X	
GS-26D-00-01	47		190	X	
GS-26D-01-06	46		200	X	
GS-27D-00-01	30		110		
GS-27D-01-06	33		130		
GS-28D-00-01	49		180	X	
GS-28D-01-06	58		200	X	
GS-29A4-00-01	94		550	X	X
GS-29A4-01-06	100		610	X	X
GS-29A5-00-01	95		500	X	X
GS-29A5-01-06	110	X	700	X	X
GS-29D-00-01	78		370	X	X
GS-29D-01-06	79		290	X	
GS-30A-00-01	92		480	X	X
GS-30A-01-06	110	X	650	X	X
GS-31A-00-01	100		500	X	X
GS-31A-01-06	100		650	X	X
GS-32A-00-01	88		440	X	X



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Lot	Arsenic		Lead		
	Concentration (mg/kg)	HQ= 1	Concentration (mg/kg)	TBLL of 3.5 (ug/dL)	TBLL of 5 (ug/dL)
GS-32A-01-06	96		570	X	X
GS-33A-00-01	83		390	X	X
GS-33A-01-06	96		450	X	X
GS-34A-00-01	89		450	X	X
GS-34A-01-06	77		410	X	X
GS-35A-00-01	74		320	X	
GS-35A-01-06	75		370	X	X
GS-36A-00-01	96		350	X	X
GS-36A-01-06	80		320	X	
GS-37A-00-01	61		240	X	
GS-37A-01-06	65		270	X	
GS-38A-00-01	50		160	X	
GS-38A-01-06	63		240	X	
GS-39A-00-01	84		250	X	
GS-39A-01-06	84		270	X	
GS-40A-00-01	64		190	X	
GS-40A-01-06	58		200	X	
GS-40A1-00-01	38		100		
GS-40A1-01-06	43		110		
GS-40A2-00-01	34		71		
GS-40A2-01-06	29		61		
GS-41A-00-01	35		77		
GS-41A-01-06	32		68		
GS-42A-00-01	29		60		



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Lot	Arsenic		Lead		
	Concentration (mg/kg)	HQ= 1	Concentration (mg/kg)	TBLL of 3.5 (ug/dL)	TBLL of 5 (ug/dL)
GS-42A-01-06	29		54		
GS-43A-00-01	29		53		
GS-43A-01-06	28		50		
GS-44A-00-01	21		50		
GS-44A-01-06	20		48		
GS-45A-00-01	32		86		
GS-45A-01-06	23		61		
GS-46A-00-01	31		84		
GS-46A-01-06	29		71		
GS-47A-00-01	27		94		
GS-47A-01-06	26		86		
GS-CA01-00-01	64		290	X	
GS-CA01-01-06	60		290	X	
GS-CA02-00-01	51		160	X	
GS-CA02-01-06	39		120		
GS-CA03-00-01	62		230	X	
GS-CA03-01-06	52		180	X	
GS-CA04-00-01	84		310	X	
GS-CA04-01-06	63		260	X	
GS-CA05-00-01	69		230	X	
GS-CA05-01-06	67		220	X	
GS-CA06-00-01	69		190	X	
GS-CA06-01-06	60		180	X	
GS-CA07-00-01	23		74		



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Lot	Arsenic		Lead		
	Concentration (mg/kg)	HQ= 1	Concentration (mg/kg)	TBLL of 3.5 (ug/dL)	TBLL of 5 (ug/dL)
GS-CA07-01-06	21		64		
GS-CA08-00-01	44		160	X	
GS-CA08-01-06	42		190	X	
GS-CA09-00-01	51		180	X	
GS-CA09-01-06	47		170	X	
GS-CA10-00-01	48		160	X	
GS-CA10-01-06	49		210	X	
GS-CA11-00-01	54		200	X	
GS-CA11-01-06	68		300	X	
GS-CA12-00-01	69		210	X	
GS-CA12-01-06	57		190	X	
GS-CA13-00-01	70		190	X	
GS-CA13-01-06	46		130		
GS-CA14-00-01	59		75		
GS-CA14-01-06	27		83		
GS-HOUSE-00-01	49		210	X	
GS-HOUSE-01-06	52		210	X	
GS-VACANT-00-01	60		210	X	
GS-VACANT-01-06	58		210	X	

NOTE: For lots with duplicate or triplicate samples the maximum value is shown, lot nomenclature: GS=Garner Street, DU= decision unit, sample depth at intervals of 00-01 or 01-06 inches, mg/kg = milligram per kilogram, HQ = Hazard Quotient, TBLL= target blood lead level, ug/dL = micrograms per deciliter



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**Attachment Table 2. Lead *In vitro* Bioaccessability Assay (IVBA) and Relative Bioavailability (RBA)**

Sample ID	Analyte		IVBA Percent	Relative Bioavailability (RBA)
	Total Lead (mg/kg)	IVBA Lead (mg/kg)		
GS-06E-00-01	140	58.1	42%	34%
GS-07E-00-01	240	57.1	24%	18%
GS-08A-00-01	100	28.4	28%	22%
GS-08B-00-01	440	22.3	5.1%	1.7%
GS-12B-00-01	340	21.8	6.4%	2.8%
GS-21D-00-01	640	83.9	13%	8.7%
GS-23D-00-01	260	41.2	16%	11%
GS-27D-00-01	110	20.9	19%	14%
GS-29A4-00-01	550	13.7	2.5%	-0.61%
GS-29D-00-01	370	65.7	18%	13%
GS-34A-00-01	450	11.8	2.6%	-0.49%
GS-36A-00-01	350	25.2	7.2%	3.5%
GS-40A-00-01	190	14.1	7.4%	3.7%
GS-CA10-00-01	160	49.2	31%	24%
GS-HOUSE-00-01	210	22.7	11%	6.7%
95% UCL			20.8%	15.5%

Note: mg/kg= milligrams per kilogram.

**Attachment Table 3. Arsenic *In vitro* Bioaccessability Assay (IVBA) and Relative Bioavailability (RBA)**

Sample ID	Analyte		IVBA Percent	Relative Bioavailability (RBA)
	Total Arsenic (mg/kg)	IVBA Arsenic (mg/kg)		
GS-04A-00-01	31.6	4.89	15%	15%
GS-04B-00-01	96.3	13.9	14%	14%
GS-05B-00-01	62.7	9.25	15%	15%
GS-08E-00-01	46.7	8.53	18%	17%
GS-09B-00-01	109	8.85	8.1%	9%
GS-10B-00-01	120	10.8	9.0%	10%
GS-11D-00-01	34.1	5.87	17%	17%
GS-16B1-00-01	35.5	4.38	12%	13%
GS-28D-00-01	48.2	7.29	15%	15%
GS-29A5-00-01	109	7.55	6.9%	8.5%
GS-33A-00-01	106	10.4	10%	11%
GS-38A-00-01	64.7	5.27	8.1%	9.4%
GS-40A1-00-01	39	4.52	12%	12%



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GS-44A-00-01	25.6	4	16%	15%
GS-HOUSE-00-01	58.2	8.02	14%	14%
95% UCL			14.3%	14.3%

Note: mg/kg= milligrams per kilogram.

**Attachment Table 4. IEUBK output at blood lead cutoff value of 3.5 µg/dL and lead concentration at soil depth of 0-1 inches**

ID	FA M	BL K	AGE (mon )	SOIL (µg/g )	DUST (µg/g )	WATE R (µg/L)	AIR (µg/m <sup>3</sup> )	Other (µg/day )	ABSSoi l (%)	ABSDus t (%)	PBB (µg/dL )	PRED (µg/dL )	P(PbB>C ) (%)
GS-01A	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	3.629
GS-01B	0	0	32	230	171	0.9	0.1	0	7.75	30	---	1.94	10.473
GS-01E	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-02A	0	0	32	91	73.7	0.9	0.1	0	7.75	30	---	1.44	2.895
GS-02B	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	4.509
GS-02E	0	0	32	170	129	0.9	0.1	0	7.75	30	---	1.72	6.593
GS-03A	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	4.055
GS-03B	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	6.032
GS-03E	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-04A	0	0	32	100	80	0.9	0.1	0	7.75	30	---	1.47	3.231
GS-04B	0	0	32	250	185	0.9	0.1	0	7.75	30	---	2.01	11.943
GS-04E	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-05A	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	4.055
GS-05B	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-06A	0	0	32	61	52.7	0.9	0.1	0	7.75	30	---	1.32	1.937
GS-06B	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-06E	0	0	32	140	108	0.9	0.1	0	7.75	30	---	1.61	4.99
GS-07A	0	0	32	80	66	0.9	0.1	0	7.75	30	---	1.39	2.516
GS-07A1	0	0	32	88	71.6	0.9	0.1	0	7.75	30	---	1.42	2.789
GS-07B	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	9.087
GS-07E	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	11.198
GS-08A	0	0	32	100	80	0.9	0.1	0	7.75	30	---	1.47	3.231
GS-08B	0	0	32	440	318	0.9	0.1	0	7.75	30	---	2.68	28.544
GS-08E	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-09B	0	0	32	360	262	0.9	0.1	0	7.75	30	---	2.4	21.162
GS-09E	0	0	32	260	192	0.9	0.1	0	7.75	30	---	2.05	12.707
GS-10B	0	0	32	430	311	0.9	0.1	0	7.75	30	---	2.65	27.61
GS-11B	0	0	32	490	353	0.9	0.1	0	7.75	30	---	2.85	33.218
GS-11D	0	0	32	92	74.4	0.9	0.1	0	7.75	30	---	1.44	2.932
GS-12B	0	0	32	340	248	0.9	0.1	0	7.75	30	---	2.33	19.377
GS-12D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18



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GS-13B	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	15.102
GS-13D	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	15.102
GS-14B	0	0	32	460	332	0.9	0.1	0	7.75	30	---	2.75	30.416
GS-14D	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-15B	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	8.428
GS-16B	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-16B1	0	0	32	92	74.4	0.9	0.1	0	7.75	30	---	1.44	2.932
GS-16D	0	0	32	150	115	0.9	0.1	0	7.75	30	---	1.65	5.498
GS-17B	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	6.032
GS-17D	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	6.032
GS-18B	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	3.629
GS-18D	0	0	32	170	129	0.9	0.1	0	7.75	30	---	1.72	6.593
GS-19B	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-20B	0	0	32	85	69.5	0.9	0.1	0	7.75	30	---	1.41	2.684
GS-20D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	8.428
GS-21D	0	0	32	640	458	0.9	0.1	0	7.75	30	---	3.36	46.649
GS-22D	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	6.032
GS-23D	0	0	32	260	192	0.9	0.1	0	7.75	30	---	2.05	12.707
GS-24D	0	0	32	140	108	0.9	0.1	0	7.75	30	---	1.61	4.99
GS-25D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	8.428
GS-26D	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-27D	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	3.629
GS-28D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-29A4	0	0	32	550	395	0.9	0.1	0	7.75	30	---	3.06	38.744
GS-29A5	0	0	32	500	360	0.9	0.1	0	7.75	30	---	2.89	34.148
GS-29D	0	0	32	370	269	0.9	0.1	0	7.75	30	---	2.44	22.067
GS-30A	0	0	32	480	346	0.9	0.1	0	7.75	30	---	2.82	32.285
GS-31A	0	0	32	500	360	0.9	0.1	0	7.75	30	---	2.89	34.148
GS-32A	0	0	32	440	318	0.9	0.1	0	7.75	30	---	2.68	28.544
GS-33A	0	0	32	390	283	0.9	0.1	0	7.75	30	---	2.51	23.897
GS-34A	0	0	32	450	325	0.9	0.1	0	7.75	30	---	2.72	29.48
GS-35A	0	0	32	320	234	0.9	0.1	0	7.75	30	---	2.26	17.631
GS-36A	0	0	32	350	255	0.9	0.1	0	7.75	30	---	2.37	20.265
GS-37A	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	11.198
GS-38A	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	6.032
GS-39A	0	0	32	250	185	0.9	0.1	0	7.75	30	---	2.01	11.943
GS-40A	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-40A1	0	0	32	100	80	0.9	0.1	0	7.75	30	---	1.47	3.231



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GS-40A2	0	0	32	71	59.7	0.9	0.1	0	7.75	30	---	1.36	2.23
GS-41A	0	0	32	77	63.9	0.9	0.1	0	7.75	30	---	1.38	2.418
GS-42A	0	0	32	60	52	0.9	0.1	0	7.75	30	---	1.32	1.909
GS-43A	0	0	32	53	47.1	0.9	0.1	0	7.75	30	---	1.3	1.722
GS-44A	0	0	32	50	45	0.9	0.1	0	7.75	30	---	1.28	1.645
GS-45A	0	0	32	86	70.2	0.9	0.1	0	7.75	30	---	1.42	2.719
GS-46A	0	0	32	84	68.8	0.9	0.1	0	7.75	30	---	1.41	2.65
GS-47A	0	0	32	94	75.8	0.9	0.1	0	7.75	30	---	1.45	3.005
GS-CA01	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	15.102
GS-CA02	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	6.032
GS-CA03	0	0	32	230	171	0.9	0.1	0	7.75	30	---	1.94	10.473
GS-CA04	0	0	32	310	227	0.9	0.1	0	7.75	30	---	2.23	16.775
GS-CA05	0	0	32	230	171	0.9	0.1	0	7.75	30	---	1.94	10.473
GS-CA06	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-CA07	0	0	32	74	61.8	0.9	0.1	0	7.75	30	---	1.37	2.323
GS-CA08	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	6.032
GS-CA09	0	0	32	170	129	0.9	0.1	0	7.75	30	---	1.72	6.593
GS-CA10	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	6.032
GS-CA11	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	8.428
GS-CA12	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	9.087
GS-CA13	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-CA14	0	0	32	75	62.5	0.9	0.1	0	7.75	30	---	1.38	2.354
GS-HOUSE	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	9.087
GS-VACANT	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	9.087

Note: Percent exceedance was calculated using values of the geometric standard deviation (GSD) of the distribution of 1.6 and the blood lead cutoff value of 3.5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), ID= lot identifier code, FAM= family or residence unit identifier, BLK= area or neighborhood identifier code, AGE= child's age in months, SOIL= soil lead concentration in microgram per gram ( $\mu\text{g}/\text{g}$ ), DUST= dust lead concentration in  $\mu\text{g}/\text{g}$ , WATER= drinking water lead concentration in  $\mu\text{g}/\text{dL}$ , AIR= air lead concentration in microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ), Other= daily intake of lead from alternate





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source, ABSSoil= bioavailability of lead in soil expressed as a percentage, ABDust= bioavailability of lead in dust expressed as a percentage, PBB= observed child blood lead level in  $\mu\text{g}/\text{dL}$ , PRED= predicted blood lead concentration in  $\mu\text{g}/\text{dL}$ ,  $P(\text{PbB}>\text{C})$ = the estimated probability of exceeding the specified blood lead level of concern expressed as a percentage, --- = missing value.

**Attachment Table 5. IEUBK output at blood lead cutoff value of 3.5  $\mu\text{g}/\text{dL}$  and lead concentration at soil depth of 1-6 inches**

ID	FAM	BLK	AGE (mon)	SOIL ( $\mu\text{g}/\text{g}$ )	DUST ( $\mu\text{g}/\text{g}$ )	WATER ( $\mu\text{g}/\text{L}$ )	AIR ( $\mu\text{g}/\text{m}^3$ )	Other ( $\mu\text{g}/\text{day}$ )	ABSSoil (%)	ABSDust (%)	PBB ( $\mu\text{g}/\text{dL}$ )	PRED ( $\mu\text{g}/\text{dL}$ )	$P(\text{PbB}>\text{C})$ (%)
GS-01A	0	0	32	97	77.9	0.9	0.1	0	7.75	30	---	1.46	3.116
GS-01B	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	3.629
GS-01E	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-02A	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	3.629
GS-02B	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	3.629
GS-02E	0	0	32	280	206	0.9	0.1	0	7.75	30	---	2.12	14.287
GS-03A	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	4.055
GS-03B	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	11.198
GS-03E	0	0	32	270	199	0.9	0.1	0	7.75	30	---	2.08	13.489
GS-04A	0	0	32	79	65.3	0.9	0.1	0	7.75	30	---	1.39	2.483
GS-04B	0	0	32	220	164	0.9	0.1	0	7.75	30	---	1.9	9.769
GS-04E	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-05A	0	0	32	100	80	0.9	0.1	0	7.75	30	---	1.47	3.231
GS-05B	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-06A	0	0	32	60	52	0.9	0.1	0	7.75	30	---	1.32	1.909
GS-06B	0	0	32	220	164	0.9	0.1	0	7.75	30	---	1.9	9.769
GS-06E	0	0	32	260	192	0.9	0.1	0	7.75	30	---	2.05	12.707
GS-07A	0	0	32	77	63.9	0.9	0.1	0	7.75	30	---	1.38	2.418
GS-07A1	0	0	32	63	54.1	0.9	0.1	0	7.75	30	---	1.33	1.994
GS-07B	0	0	32	250	185	0.9	0.1	0	7.75	30	---	2.01	11.943
GS-07E	0	0	32	430	311	0.9	0.1	0	7.75	30	---	2.65	27.61
GS-08A	0	0	32	54	47.8	0.9	0.1	0	7.75	30	---	1.3	1.748
GS-08B	0	0	32	460	332	0.9	0.1	0	7.75	30	---	2.75	30.416
GS-08E	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	11.198
GS-09B	0	0	32	460	332	0.9	0.1	0	7.75	30	---	2.75	30.416
GS-09E	0	0	32	380	276	0.9	0.1	0	7.75	30	---	2.47	22.979
GS-10B	0	0	32	580	416	0.9	0.1	0	7.75	30	---	3.16	41.441
GS-11B	0	0	32	610	437	0.9	0.1	0	7.75	30	---	3.26	44.079
GS-11D	0	0	32	150	115	0.9	0.1	0	7.75	30	---	1.65	5.498
GS-12B	0	0	32	570	409	0.9	0.1	0	7.75	30	---	3.13	40.548
GS-12D	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	11.198



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GS-13B	0	0	32	490	353	0.9	0.1	0	7.75	30	---	2.85	33.218
GS-13D	0	0	32	230	171	0.9	0.1	0	7.75	30	---	1.94	10.473
GS-14B	0	0	32	460	332	0.9	0.1	0	7.75	30	---	2.75	30.416
GS-14D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	8.428
GS-15B	0	0	32	220	164	0.9	0.1	0	7.75	30	---	1.9	9.769
GS-16B	0	0	32	250	185	0.9	0.1	0	7.75	30	---	2.01	11.943
GS-16B1	0	0	32	79	65.3	0.9	0.1	0	7.75	30	---	1.39	2.483
GS-16D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-17B	0	0	32	150	115	0.9	0.1	0	7.75	30	---	1.65	5.498
GS-17D	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	9.087
GS-18B	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	4.055
GS-18D	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	4.509
GS-19B	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	3.629
GS-20B	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	4.509
GS-20D	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	4.055
GS-21D	0	0	32	500	360	0.9	0.1	0	7.75	30	---	2.89	34.148
GS-22D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-23D	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-24D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-25D	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	11.198
GS-26D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	8.428
GS-27D	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	4.509
GS-28D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	8.428
GS-29A4	0	0	32	610	437	0.9	0.1	0	7.75	30	---	3.26	44.079
GS-29A5	0	0	32	700	500	0.9	0.1	0	7.75	30	---	3.57	51.563
GS-29D	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	15.102
GS-30A	0	0	32	650	465	0.9	0.1	0	7.75	30	---	3.4	47.49
GS-31A	0	0	32	650	465	0.9	0.1	0	7.75	30	---	3.4	47.49
GS-32A	0	0	32	570	409	0.9	0.1	0	7.75	30	---	3.13	40.548
GS-33A	0	0	32	450	325	0.9	0.1	0	7.75	30	---	2.72	29.48
GS-34A	0	0	32	410	297	0.9	0.1	0	7.75	30	---	2.58	25.747
GS-35A	0	0	32	370	269	0.9	0.1	0	7.75	30	---	2.44	22.067
GS-36A	0	0	32	320	234	0.9	0.1	0	7.75	30	---	2.26	17.631
GS-37A	0	0	32	270	199	0.9	0.1	0	7.75	30	---	2.08	13.489
GS-38A	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	11.198
GS-39A	0	0	32	270	199	0.9	0.1	0	7.75	30	---	2.08	13.489
GS-40A	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	8.428



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GS-40A1	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	3.629
GS-40A2	0	0	32	61	52.7	0.9	0.1	0	7.75	30	---	1.32	1.937
GS-41A	0	0	32	68	57.6	0.9	0.1	0	7.75	30	---	1.35	2.139
GS-42A	0	0	32	54	47.8	0.9	0.1	0	7.75	30	---	1.3	1.748
GS-43A	0	0	32	50	45	0.9	0.1	0	7.75	30	---	1.28	1.645
GS-44A	0	0	32	48	43.6	0.9	0.1	0	7.75	30	---	1.28	1.595
GS-45A	0	0	32	61	52.7	0.9	0.1	0	7.75	30	---	1.32	1.937
GS-46A	0	0	32	71	59.7	0.9	0.1	0	7.75	30	---	1.36	2.23
GS-47A	0	0	32	86	70.2	0.9	0.1	0	7.75	30	---	1.42	2.719
GS-CA01	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	15.102
GS-CA02	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	4.055
GS-CA03	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-CA04	0	0	32	260	192	0.9	0.1	0	7.75	30	---	2.05	12.707
GS-CA05	0	0	32	220	164	0.9	0.1	0	7.75	30	---	1.9	9.769
GS-CA06	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	7.18
GS-CA07	0	0	32	64	54.8	0.9	0.1	0	7.75	30	---	1.34	2.022
GS-CA08	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-CA09	0	0	32	170	129	0.9	0.1	0	7.75	30	---	1.72	6.593
GS-CA10	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	9.087
GS-CA11	0	0	32	300	220	0.9	0.1	0	7.75	30	---	2.19	15.931
GS-CA12	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	7.792
GS-CA13	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	4.509
GS-CA14	0	0	32	83	68.1	0.9	0.1	0	7.75	30	---	1.41	2.616
GS-HOUSE	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	9.087



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GS-VACANT	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	9.087
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Note: Percent exceedance was calculated using values of the geometric standard deviation (GSD) of the distribution of 1.6 and the blood lead cutoff value of 3.5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), ID= lot identifier code, FAM= family or residence unit identifier, BLK= area or neighborhood identifier code, AGE= child's age in months, SOIL= soil lead concentration in microgram per gram ( $\mu\text{g}/\text{g}$ ), DUST= dust lead concentration in  $\mu\text{g}/\text{g}$ , WATER= drinking water lead concentration in  $\mu\text{g}/\text{dL}$ , AIR= air lead concentration in microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ), Other= daily intake of lead from alternate source, ABSSoil= bioavailability of lead in soil expressed as a percentage, ABSDust= bioavailability of lead in dust expressed as a percentage, PBB= observed child blood lead level in  $\mu\text{g}/\text{dL}$ , PRED= predicted blood lead concentration in  $\mu\text{g}/\text{dL}$ ,  $P(\text{PbB}>\text{C})$ = the estimated probability of exceeding the specified blood lead level of concern expressed as a percentage, --- = missing value.

**Attachment Table 6. IEUBK output at blood lead cutoff value of 5  $\mu\text{g}/\text{dL}$  and lead concentration at soil depth of 0-1 inches**

ID	FAM	BLK	AGE (mon)	SOIL ( $\mu\text{g}/\text{g}$ )	DUST ( $\mu\text{g}/\text{g}$ )	WATER ( $\mu\text{g}/\text{L}$ )	AIR ( $\mu\text{g}/\text{m}^3$ )	Other ( $\mu\text{g}/\text{day}$ )	ABSSoil (%)	ABSDust (%)	PBB ( $\mu\text{g}/\text{dL}$ )	PRED ( $\mu\text{g}/\text{dL}$ )	$P(\text{PbB}>\text{C})$ (%)
GS-01A	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	0.532
GS-01B	0	0	32	230	171	0.9	0.1	0	7.75	30	---	1.94	2.201
GS-01E	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-02A	0	0	32	91	73.7	0.9	0.1	0	7.75	30	---	1.44	0.396
GS-02B	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	0.708
GS-02E	0	0	32	170	129	0.9	0.1	0	7.75	30	---	1.72	1.174
GS-03A	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	0.615
GS-03B	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	1.042
GS-03E	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-04A	0	0	32	100	80	0.9	0.1	0	7.75	30	---	1.47	0.457
GS-04B	0	0	32	250	185	0.9	0.1	0	7.75	30	---	2.01	2.639
GS-04E	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-05A	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	0.615
GS-05B	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-06A	0	0	32	61	52.7	0.9	0.1	0	7.75	30	---	1.32	0.236
GS-06B	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-06E	0	0	32	140	108	0.9	0.1	0	7.75	30	---	1.61	0.809
GS-07A	0	0	32	80	66	0.9	0.1	0	7.75	30	---	1.39	0.33
GS-07A1	0	0	32	88	71.6	0.9	0.1	0	7.75	30	---	1.42	0.377
GS-07B	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	1.812
GS-07E	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	2.414
GS-08A	0	0	32	100	80	0.9	0.1	0	7.75	30	---	1.47	0.457



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GS-08B	0	0	32	440	318	0.9	0.1	0	7.75	30	---	2.68	9.248
GS-08E	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-09B	0	0	32	360	262	0.9	0.1	0	7.75	30	---	2.4	5.942
GS-09E	0	0	32	260	192	0.9	0.1	0	7.75	30	---	2.05	2.877
GS-10B	0	0	32	430	311	0.9	0.1	0	7.75	30	---	2.65	8.797
GS-11B	0	0	32	490	353	0.9	0.1	0	7.75	30	---	2.85	11.648
GS-11D	0	0	32	92	74.4	0.9	0.1	0	7.75	30	---	1.44	0.403
GS-12B	0	0	32	340	248	0.9	0.1	0	7.75	30	---	2.33	5.23
GS-12D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-13B	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	3.665
GS-13D	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	3.665
GS-14B	0	0	32	460	332	0.9	0.1	0	7.75	30	---	2.75	10.18
GS-14D	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-15B	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	1.635
GS-16B	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-16B1	0	0	32	92	74.4	0.9	0.1	0	7.75	30	---	1.44	0.403
GS-16D	0	0	32	150	115	0.9	0.1	0	7.75	30	---	1.65	0.92
GS-17B	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	1.042
GS-17D	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	1.042
GS-18B	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	0.532
GS-18D	0	0	32	170	129	0.9	0.1	0	7.75	30	---	1.72	1.174
GS-19B	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-20B	0	0	32	85	69.5	0.9	0.1	0	7.75	30	---	1.41	0.359
GS-20D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	1.635
GS-21D	0	0	32	640	458	0.9	0.1	0	7.75	30	---	3.36	19.963
GS-22D	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	1.042
GS-23D	0	0	32	260	192	0.9	0.1	0	7.75	30	---	2.05	2.877
GS-24D	0	0	32	140	108	0.9	0.1	0	7.75	30	---	1.61	0.809
GS-25D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	1.635
GS-26D	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-27D	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	0.532
GS-28D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-29A4	0	0	32	550	395	0.9	0.1	0	7.75	30	---	3.06	14.804
GS-29A5	0	0	32	500	360	0.9	0.1	0	7.75	30	---	2.89	12.154
GS-29D	0	0	32	370	269	0.9	0.1	0	7.75	30	---	2.44	6.316
GS-30A	0	0	32	480	346	0.9	0.1	0	7.75	30	---	2.82	11.15
GS-31A	0	0	32	500	360	0.9	0.1	0	7.75	30	---	2.89	12.154
GS-32A	0	0	32	440	318	0.9	0.1	0	7.75	30	---	2.68	9.248



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GS-33A	0	0	32	390	283	0.9	0.1	0	7.75	30	---	2.51	7.098
GS-34A	0	0	32	450	325	0.9	0.1	0	7.75	30	---	2.72	9.709
GS-35A	0	0	32	320	234	0.9	0.1	0	7.75	30	---	2.26	4.567
GS-36A	0	0	32	350	255	0.9	0.1	0	7.75	30	---	2.37	5.58
GS-37A	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	2.414
GS-38A	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	1.042
GS-39A	0	0	32	250	185	0.9	0.1	0	7.75	30	---	2.01	2.639
GS-40A	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-40A1	0	0	32	100	80	0.9	0.1	0	7.75	30	---	1.47	0.457
GS-40A2	0	0	32	71	59.7	0.9	0.1	0	7.75	30	---	1.36	0.283
GS-41A	0	0	32	77	63.9	0.9	0.1	0	7.75	30	---	1.38	0.314
GS-42A	0	0	32	60	52	0.9	0.1	0	7.75	30	---	1.32	0.231
GS-43A	0	0	32	53	47.1	0.9	0.1	0	7.75	30	---	1.3	0.203
GS-44A	0	0	32	50	45	0.9	0.1	0	7.75	30	---	1.28	0.191
GS-45A	0	0	32	86	70.2	0.9	0.1	0	7.75	30	---	1.42	0.365
GS-46A	0	0	32	84	68.8	0.9	0.1	0	7.75	30	---	1.41	0.353
GS-47A	0	0	32	94	75.8	0.9	0.1	0	7.75	30	---	1.45	0.416
GS-CA01	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	3.665
GS-CA02	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	1.042
GS-CA03	0	0	32	230	171	0.9	0.1	0	7.75	30	---	1.94	2.201
GS-CA04	0	0	32	310	227	0.9	0.1	0	7.75	30	---	2.23	4.254
GS-CA05	0	0	32	230	171	0.9	0.1	0	7.75	30	---	1.94	2.201
GS-CA06	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-CA07	0	0	32	74	61.8	0.9	0.1	0	7.75	30	---	1.37	0.298
GS-CA08	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	1.042
GS-CA09	0	0	32	170	129	0.9	0.1	0	7.75	30	---	1.72	1.174
GS-CA10	0	0	32	160	122	0.9	0.1	0	7.75	30	---	1.69	1.042
GS-CA11	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	1.635
GS-CA12	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	1.812



# MEMORANDUM

GS-CA13	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-CA14	0	0	32	75	62.5	0.9	0.1	0	7.75	30	---	1.38	0.303
GS-HOUSE	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	1.812
GS-VACANT	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	1.812

Note: Percent exceedance was calculated using values of the geometric standard deviation (GSD) of the distribution of 1.6 and the blood lead cutoff value of 5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), ID= lot identifier code, FAM= family or residence unit identifier, BLK= area or neighborhood identifier code, AGE= child's age in months, SOIL= soil lead concentration in microgram per gram ( $\mu\text{g}/\text{g}$ ), DUST= dust lead concentration in  $\mu\text{g}/\text{g}$ , WATER= drinking water lead concentration in  $\mu\text{g}/\text{dL}$ , AIR= air lead concentration in microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ), Other= daily intake of lead from alternate source, ABSSoil= bioavailability of lead in soil expressed as a percentage, ABSDust= bioavailability of lead in dust expressed as a percentage, PBB= observed child blood lead level in  $\mu\text{g}/\text{dL}$ , PRED= predicted blood lead concentration in  $\mu\text{g}/\text{dL}$ ,  $P(\text{PbB}>\text{C})$ = the estimated probability of exceeding the specified blood lead level of concern expressed as a percentage, --- = missing value.

**Attachment Table 7. IEUBK output at blood lead cutoff value of 5  $\mu\text{g}/\text{dL}$  and lead concentration at soil depth of 1-6 inches**

ID	FAM	BLK	AGE (mon)	SOIL ( $\mu\text{g}/\text{g}$ )	DUST ( $\mu\text{g}/\text{g}$ )	WATER ( $\mu\text{g}/\text{L}$ )	AIR ( $\mu\text{g}/\text{m}^3$ )	Other ( $\mu\text{g}/\text{day}$ )	ABSSoil (%)	ABSDust (%)	PBB ( $\mu\text{g}/\text{dL}$ )	PRED ( $\mu\text{g}/\text{dL}$ )	$P(\text{PbB}>\text{C})$ (%)
GS-01A	0	0	32	97	77.9	0.9	0.1	0	7.75	30	---	1.46	0.436
GS-01B	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	0.532
GS-01E	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-02A	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	0.532
GS-02B	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	0.532
GS-02E	0	0	32	280	206	0.9	0.1	0	7.75	30	---	2.12	3.39
GS-03A	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	0.615
GS-03B	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	2.414
GS-03E	0	0	32	270	199	0.9	0.1	0	7.75	30	---	2.08	3.127
GS-04A	0	0	32	79	65.3	0.9	0.1	0	7.75	30	---	1.39	0.325
GS-04B	0	0	32	220	164	0.9	0.1	0	7.75	30	---	1.9	2
GS-04E	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-05A	0	0	32	100	80	0.9	0.1	0	7.75	30	---	1.47	0.457
GS-05B	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-06A	0	0	32	60	52	0.9	0.1	0	7.75	30	---	1.32	0.231
GS-06B	0	0	32	220	164	0.9	0.1	0	7.75	30	---	1.9	2
GS-06E	0	0	32	260	192	0.9	0.1	0	7.75	30	---	2.05	2.877
GS-07A	0	0	32	77	63.9	0.9	0.1	0	7.75	30	---	1.38	0.314



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GS-07A1	0	0	32	63	54.1	0.9	0.1	0	7.75	30	---	1.33	0.245
GS-07B	0	0	32	250	185	0.9	0.1	0	7.75	30	---	2.01	2.639
GS-07E	0	0	32	430	311	0.9	0.1	0	7.75	30	---	2.65	8.797
GS-08A	0	0	32	54	47.8	0.9	0.1	0	7.75	30	---	1.3	0.207
GS-08B	0	0	32	460	332	0.9	0.1	0	7.75	30	---	2.75	10.18
GS-08E	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	2.414
GS-09B	0	0	32	460	332	0.9	0.1	0	7.75	30	---	2.75	10.18
GS-09E	0	0	32	380	276	0.9	0.1	0	7.75	30	---	2.47	6.701
GS-10B	0	0	32	580	416	0.9	0.1	0	7.75	30	---	3.16	16.476
GS-11B	0	0	32	610	437	0.9	0.1	0	7.75	30	---	3.26	18.198
GS-11D	0	0	32	150	115	0.9	0.1	0	7.75	30	---	1.65	0.92
GS-12B	0	0	32	570	409	0.9	0.1	0	7.75	30	---	3.13	15.913
GS-12D	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	2.414
GS-13B	0	0	32	490	353	0.9	0.1	0	7.75	30	---	2.85	11.648
GS-13D	0	0	32	230	171	0.9	0.1	0	7.75	30	---	1.94	2.201
GS-14B	0	0	32	460	332	0.9	0.1	0	7.75	30	---	2.75	10.18
GS-14D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	1.635
GS-15B	0	0	32	220	164	0.9	0.1	0	7.75	30	---	1.9	2
GS-16B	0	0	32	250	185	0.9	0.1	0	7.75	30	---	2.01	2.639
GS-16B1	0	0	32	79	65.3	0.9	0.1	0	7.75	30	---	1.39	0.325
GS-16D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-17B	0	0	32	150	115	0.9	0.1	0	7.75	30	---	1.65	0.92
GS-17D	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	1.812
GS-18B	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	0.615
GS-18D	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	0.708
GS-19B	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	0.532
GS-20B	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	0.708
GS-20D	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	0.615
GS-21D	0	0	32	500	360	0.9	0.1	0	7.75	30	---	2.89	12.154
GS-22D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-23D	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-24D	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-25D	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	2.414
GS-26D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	1.635
GS-27D	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	0.708
GS-28D	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	1.635
GS-29A4	0	0	32	610	437	0.9	0.1	0	7.75	30	---	3.26	18.198





# MEMORANDUM

GS-29A5	0	0	32	700	500	0.9	0.1	0	7.75	30	---	3.57	23.586
GS-29D	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	3.665
GS-30A	0	0	32	650	465	0.9	0.1	0	7.75	30	---	3.4	20.559
GS-31A	0	0	32	650	465	0.9	0.1	0	7.75	30	---	3.4	20.559
GS-32A	0	0	32	570	409	0.9	0.1	0	7.75	30	---	3.13	15.913
GS-33A	0	0	32	450	325	0.9	0.1	0	7.75	30	---	2.72	9.709
GS-34A	0	0	32	410	297	0.9	0.1	0	7.75	30	---	2.58	7.926
GS-35A	0	0	32	370	269	0.9	0.1	0	7.75	30	---	2.44	6.316
GS-36A	0	0	32	320	234	0.9	0.1	0	7.75	30	---	2.26	4.567
GS-37A	0	0	32	270	199	0.9	0.1	0	7.75	30	---	2.08	3.127
GS-38A	0	0	32	240	178	0.9	0.1	0	7.75	30	---	1.98	2.414
GS-39A	0	0	32	270	199	0.9	0.1	0	7.75	30	---	2.08	3.127
GS-40A	0	0	32	200	150	0.9	0.1	0	7.75	30	---	1.83	1.635
GS-40A1	0	0	32	110	87	0.9	0.1	0	7.75	30	---	1.51	0.532
GS-40A2	0	0	32	61	52.7	0.9	0.1	0	7.75	30	---	1.32	0.236
GS-41A	0	0	32	68	57.6	0.9	0.1	0	7.75	30	---	1.35	0.268
GS-42A	0	0	32	54	47.8	0.9	0.1	0	7.75	30	---	1.3	0.207
GS-43A	0	0	32	50	45	0.9	0.1	0	7.75	30	---	1.28	0.191
GS-44A	0	0	32	48	43.6	0.9	0.1	0	7.75	30	---	1.28	0.184
GS-45A	0	0	32	61	52.7	0.9	0.1	0	7.75	30	---	1.32	0.236
GS-46A	0	0	32	71	59.7	0.9	0.1	0	7.75	30	---	1.36	0.283
GS-47A	0	0	32	86	70.2	0.9	0.1	0	7.75	30	---	1.42	0.365
GS-CA01	0	0	32	290	213	0.9	0.1	0	7.75	30	---	2.15	3.665
GS-CA02	0	0	32	120	94	0.9	0.1	0	7.75	30	---	1.54	0.615
GS-CA03	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-CA04	0	0	32	260	192	0.9	0.1	0	7.75	30	---	2.05	2.877
GS-CA05	0	0	32	220	164	0.9	0.1	0	7.75	30	---	1.9	2
GS-CA06	0	0	32	180	136	0.9	0.1	0	7.75	30	---	1.76	1.316
GS-CA07	0	0	32	64	54.8	0.9	0.1	0	7.75	30	---	1.34	0.249
GS-CA08	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47



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GS-CA09	0	0	32	170	129	0.9	0.1	0	7.75	30	---	1.72	1.174
GS-CA10	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	1.812
GS-CA11	0	0	32	300	220	0.9	0.1	0	7.75	30	---	2.19	3.953
GS-CA12	0	0	32	190	143	0.9	0.1	0	7.75	30	---	1.8	1.47
GS-CA13	0	0	32	130	101	0.9	0.1	0	7.75	30	---	1.58	0.708
GS-CA14	0	0	32	83	68.1	0.9	0.1	0	7.75	30	---	1.41	0.347
GS-HOUSE	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	1.812
GS-VACANT	0	0	32	210	157	0.9	0.1	0	7.75	30	---	1.87	1.812

Note: Percent exceedance was calculated using values of the geometric standard deviation (GSD) of the distribution of 1.6 and the blood lead cutoff value of 5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), ID= lot identifier code, FAM= family or residence unit identifier, BLK= area or neighborhood identifier code, AGE= child's age in months, SOIL= soil lead concentration in microgram per gram ( $\mu\text{g}/\text{g}$ ), DUST= dust lead concentration in  $\mu\text{g}/\text{g}$ , WATER= drinking water lead concentration in  $\mu\text{g}/\text{dL}$ , AIR= air lead concentration in microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ), Other= daily intake of lead from alternate source, ABSSoil= bioavailability of lead in soil expressed as a percentage, ABSDust= bioavailability of lead in dust expressed as a percentage, PBB= observed child blood lead level in  $\mu\text{g}/\text{dL}$ , PRED= predicted blood lead concentration in  $\mu\text{g}/\text{dL}$ ,  $P(\text{PbB}>\text{C})$ = the estimated probability of exceeding the specified blood lead level of concern expressed as a percentage, --- = missing value.



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## References

CDC 2024. CDC Updates Blood Lead Reference Value. Accessed November 14, 2024 from <https://www.cdc.gov/lead-prevention/php/news-features/updates-blood-lead-reference-value.html>

Colorado Department of Public Health and Environment (CDPHE). 2014. Arsenic Concentrations in Soil, Risk management guidance for evaluating. July.

Diamond et al. 2016. Gary L Diamond, Karen D Bradham, William J Brattin, Michele Burgess, Susan Griffin, Cheryl A Hawkins, Albert L Juhasz, Julie M Klotzbach, Clay Nelson, Yvette W Lowney, Kirk G Scheckel, David J Thomas 2016. Predicting oral relative bioavailability of arsenic in soil from in vitro bioaccessibility. Journal of Toxicology and Environmental Health, Part A. Volume 79, Issue 4, 2016.

Tetra Tech 2024. Site Inspection Report, Highway 24 Mill Site, Colorado Springs, El Paso County, Colorado. U.S. EPA ID NO. CON000821192. June.

United States Geological Survey (USGS) 2024. USGS Background Soil-Lead Survey: State Data. Accessed online March 18 at <https://www.epa.gov/superfund/usgs-background-soil-lead-survey-state-data#CO>

USEPA 1994a. Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. Publication # 9285.7-15-1. February.

USEPA 1994b. Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Directive #9355.4-12. July.

USEPA 1998. Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive # 9200. 4-27P. EPA/540/F-98/030. August.

USEPA 2007. Estimation of Relative Bioavailability of Lead in Soil and Soil-like Materials Using In Vivo and In Vitro Methods. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Directive # 9285.7-77. July.