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APPENDIX C

IEUBKwin PARAMETER DICTIONARY

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DESCRIPTION OF PARAMETERS IN THE IEUBKwin MODEL

Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
ABSD	Total absorption for dust at low saturation (maximum absorption coefficient, active)	0.300	unitless	0–84	E	Based on U.S. EPA (1989a).	U-1c,d,i,j, U-2
ABSF	Total absorption for food at low saturation (maximum absorption coefficient, active)	0.500	unitless	0–84	E	Based on U.S. EPA (1989a).	U-1a,g, U-2
ABSO	Fraction absorption from paint ingested at low saturation (maximum absorption coefficient, active)	0.000	unitless	0–84	E	Based on the default condition that there is no source of lead paint for ingestion in the household.	U-1f,l, U-2
ABSS	Fraction absorption from soil at low saturation (maximum absorption coefficient, active)	0.300	unitless	0–84	E	Based on U.S. EPA (1989a).	U-1e,k, U-2
ABSW	Total absorption for water at low saturation (maximum absorption coefficient, active)	0.500	unitless	0–84	E	Based on U.S. EPA (1989a).	U-1b,h, U-2
air_absorp[AGE]	Net percentage of lung absorption of air lead	32.000	%	0–84	E	Deposition efficiencies of airborne lead particles were estimated by U.S. EPA (1989a). A respiratory deposition/absorption rate of 25% to 45% is reported for young children living in non-point source areas while a rate of 42% is calculated for those living near point sources. An intermediate value of 32% was chosen.	U-4
air_concentration[AGE]	Outdoor air lead concentration	0.100	µg/m^3	0–84	E	Based on the lower end of the range 0.1–0.3 µg Pb/m^3 that is reported for outdoor air lead concentration in U.S. cities without lead point sources (U.S. EPA, 1989a).	E-1, E-2, E-11a,b
ALLOMET[15]	Storage array	0.333	unitless	0–84	I	Stores variable and constant values. The exponent, 0.333, in Equations B-1a through B-1e is stored in this array.	B-1a–B-1e
AVD	Fraction available for dust	1.000	unitless	0–84	I	Variable added for later flexibility in describing the absorption process; has no effect in current algorithm.	U-1c,d,i,j
AVF	Fraction available for food/diet	1.000	unitless	0–84	I	Variable added for later flexibility in describing the absorption process; has no effect in current algorithm.	U-1a,g
AvgHouseDust	Average household dust concentration	150.000	µg/g	0–84	I	Value calculated/assigned based on alternate dust lead sources (e.g., day care, sechome, paint, school, and workplace).	—

Note: I = internal model parameter; E = external, user-specified parameter

Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
AvgMultiSrc	Multiple Source Analysis average	150.000	µg/g	0–84	I	Based on the contribution of lead from soil, air and alternate indoor sources (such as day care, sechome, paint, school, and workplace).	—
AVINTAKE[MONTH]	Available intake	U-2	µg/day	0–84	I	The amount of lead that is available for intake.	U-1g,h,i,j,k,l, U-2
AVO	Fraction available for paint	1.000	unitless	0–84	I	Variable added for later flexibility in describing the absorption process; has no effect in current algorithm.	U-1f,l
AVS	Fraction available for soil	1.000	unitless	0–84	I	Variable added for later flexibility in describing the absorption process; has no effect in current algorithm.	U-1e,k
AVW	Fraction available for water	1.000	unitless	0–84	I	Variable added for later flexibility in describing the absorption process; has no effect in current algorithm.	U-1b,h
beverage[AGE]	Lead intake from beverages by age	E-4d	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5o
beverageConc	Lead concentration in beverages	0.002109	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4d
beverage_Consump[AGE]	Daily consumption of beverages	87.993 116.487 209.677 194.982 177.061 183.333 188.710	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4d
BLOOD[STEPS]	Blood lead concentration	B-10a,c	µg/dL	0–84	I	Summation variable used to get the average blood lead concentration for monthly period.	B-10a,c

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
bread[AGE]	Lead intake from breads by age	E-4e	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5m
breadConc	Lead concentration in bread	0.008927	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4e
bread_Consump[AGE]	Daily consumption of bread	4.992 15.862 13.311 16.639 19.967 22.629 27.898	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4e
can_fruit[AGE]	Lead intake from canned fruit, when fruit is consumed only in canned form, at age range	E-4f	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5d
canFruitConc	Lead concentration in canned fruit	0.023873	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4f
canFruit_Consump[AGE]	Daily consumption of canned fruit	13.941 8.183 8.145 7.691 7.236 7.460 7.906	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4f

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
can_veg[AGE]	Lead intake from canned vegetables, when vegetable is consumed only in canned form, by age	E-4g	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5b
candy[AGE]	Lead intake from candies by age	E-4h	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5p
candyConc	Lead concentration in candy	0.011554	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4h
candy_Consump[AGE]	Daily consumption of candy	9.955 11.273 32.909 24.409 16.000 14.818 12.455	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4h
canVegConc	Lead concentration in canned vegetables	0.004003	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4g
canVeg_Consump[AGE]	Daily consumption of canned vegetables	0.668 2.274 2.563 2.662 2.771 2.626 2.356	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4g

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
CONRBC	Maximum lead concentration capacity of red blood cells	1200.000	µg/dL	0–84	I	Based on Marcus' (1983) reanalysis of infant baboon data from Mallon (1983). See Marcus (1985a) for assessment of form of relationship and estimates from data on human adults [data from deSilva, 1981a,b; Manton and Malloy, 1983; and Manton and Cook 1984]; and infant and juvenile baboons (Mallon, 1983).	B-2.5
constant_dust_conc[AGE]	Dust lead concentration at age range	200.000	µg/g	0–84	E	Air Quality Criteria Document for Lead (U.S. EPA, 1986).	E-9a, E-11d
constant_indoor_dust	Constant indoor dust lead concentration at age range	200.000	µg/g	0–84	E	Air Quality Criteria Document for Lead (U.S. EPA, 1986).	—
constant_outdoor_dust	Constant outdoor dust lead concentration at age range	200.000	µg/g	0–84	E	Air Quality Criteria Document for Lead (U.S. EPA, 1986).	—
constant_outdoor_soil	Constant outdoor soil lead concentration at age range	200.000	µg/g	0–84	E	Air Quality Criteria Document for Lead (U.S. EPA, 1986)	—
constant_soil_conc[AGE]	Soil lead concentration at age range	200.000	µg/g	0–84	E	Air Quality Criteria Document for Lead (U.S. EPA, 1986).	E-8a
constant_water_conc	Water lead concentration at age range	4.000	µg/L	0–84	E	Based on analysis of data from the American Water Works Service Co. (Marcus, 1989)	E-6a
contrib_percent	Ratio of indoor dust lead concentration to soil lead concentration	0.700	µg/g per µg/g	0–84	E	Analysis of soil and dust data from 1983 East Helena study (U.S. EPA, 1989a). Additional information on this variable can be obtained from the MSD short sheet (EPA 540-F-008, OSWER 9285.7-34 [June 1998]) available on the TRW website.	E-11a,b
CRBONEBL[MONTH]	Ratio of lead concentration (µg/kg) in bone to blood lead concentration (µg/L) at age range	B-4c	L/kg	0–84	I	Data in Barry (1981) were used. Bone lead concentration was calculated as an arithmetic average of the concentrations in the rib, tibia, and calvaria. The blood lead concentrations were taken directly from the study. Concentrations in each of the following eight age groups were considered: stillbirths, 0–12 days, 1–11 mos, 1–5 yrs, 6–9 yrs, 11–16 yrs, adult (men), and adult (women). Ages 0 and 40 yrs were assumed for stillbirths and adults, respectively.	B-1h, B-4c

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
CRKIDBL[MONTH]	Ratio of lead concentration (µg/kg) in kidney to blood lead concentration (µgL) at age range	B-4a	L/kg	0–84	I	Data in Barry (1981) were used. Lead concentrations in kidney (combined values for cortex and medulla) and blood were taken directly from the study. Concentrations in each of the following eight age groups were considered: stillbirths, 0–12 days, 1–11 mos, 1–5 yrs, 6–9 yrs, 11–16 yrs, adult (men), and adult (women). Ages 0 and 40 yrs were assumed for stillbirths and adults, respectively.	B-2h, B-4a
CRLIVBL[MONTH]	Ratio of lead concentration (µg/kg) in liver to blood lead concentration (µg/L) at age range	B-4b	L/kg	0–84	I	Data in Barry (1981) were used. Lead concentrations in liver and blood were taken directly from the study. Concentrations in each of the following eight age groups were considered: stillbirths, 0–12 days, 1–11 mos, 1–5 yrs, 6–9 yrs, 11–16 yrs, adult (men), and adult (women). Ages 0 and 40 yrs were assumed for stillbirths and adults, respectively.	B-2e,f, B-4b
CROTHBL[MONTH]	Ratio of lead concentration (µg/kg) in other soft tissue to blood lead concentration (µg/L) at age range	B-4d	L/kg	0–84	I	Data in Barry (1981) were used. Lead concentration ratio for soft tissues was calculated as a weighted arithmetic average of concentration ratios for muscle (53.8%), fat (24.0%), skin (9.4%), dense connective tissue (4.4%), brain (2.7%), GI tract (2.3%), lung (1.9%), heart (0.7%), spleen (0.3%), pancreas (0.2%), and aorta (0.2%), where the weights applied are given in parentheses. The weight associated with each soft tissue component was equal to the weight of the component (kg) divided by weight of all soft tissues (kg). These weights were estimated from Schroeder and Tipton (1968) and are assumed to apply in the range 0–84 months of age. Concentrations in each of the following eight age groups were considered: stillbirths, 0–12 days, 1–11 mos, 1–5 yrs, 6–9 yrs, 11–16 yrs, adult (men), and adult (women). Ages 0 and 40 yrs were assumed for stillbirths and adults, respectively.	B-2n,o, B-4d
Cutoff	Blood lead level of concern	10	µg/dL	0-84	E	USEPA, 1986, 1990; CDC, 1991.	—

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
dairy[AGE]	Lead intake from dairy products by age	E-4i	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5j
dairyConc	Lead concentration in dairy products	0.004476	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4i
dairy_Consump[AGE]	Daily consumption of dairy products	41.784 35.321 38.527 38.327 38.176 40.631 45.591	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4i
DAYCARE[AGE]	Dust lead intake from daycare	E-12c	µg/day	0–84	I	Simple combination of the total amount of dust ingested daily, fraction of total dust ingested as daycare dust, and dust lead concentration at daycare.	E-9c, E-12c
DaycareConc	Dust lead concentration from daycare	200.000	µg/g	0–84	E	Based on the assumption that default daycare dust concentrations are the same as default residence dust concentrations.	E-12c
DaycareFraction	Fraction of total dust ingested daily from daycare dust	0.000	unitless	0–84	E	Based on the default assumption that the child does not attend daycare.	E-9.5, E-12c
diet_intake[AGE]	User-specified diet lead intake by age	3.160 2.600 2.870 2.740 2.610 2.740 2.990	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-4a
DietTotal[AGE]	Total dietary intake at age range	E-4b	µg/day	0–84	I	Sum of all dietary sources; same as INDIET[AGE].	E-4b

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
dust_indoor[AGE]	User-specified indoor dust concentration at age range	200.000	µg/g	0–84	E	Under alternate dust sources model, based on assumption that both soil and outdoor air contribute to indoor dust lead.	E-11c
DustTotal[AGE]	Daily amount of dust ingested at age range	E-10	g/day	0–84	I	Simple combination of total amount of soil and dust ingested daily and fraction of this combined ingestion that is dust alone.	E-9b, E-10, E-12a-e
EXPR[0]	The available capacity of the red blood cells to carry lead; i.e.,1 - lead concentration in RBC at birth	B-7i	unitless	0	I	Calculated value.	B-7i
f_fruit[AGE]	Lead intake from fresh fruit, if no home-grown fruit is consumed, by age	E-4j	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5e
fFruitConc	Lead concentration in fresh fruits	0.004462	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4j
fFruit_Consump[AGE]	Daily consumption of fresh fruit	2.495 12.540 11.196 11.196 11.452 12.988 16.059	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4j
f_veg[AGE]	Lead intake from fresh vegetables, if no home-grown vegetables are consumed, by age	E-4k	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5c
fVegConc	Lead concentration in fresh vegetables	0.006719	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4k

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
fVeg_Consump[AGE]	Daily consumption of fresh vegetables	8.773 15.945 28.156 27.623 27.030 29.164 33.373	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4k
FirstDrawConc	First draw water lead concentration	4.000	µg/L	0–84	E	Based on analysis of data from the American Water Works Service Co. (Marcus, 1989).	E-6b
FirstDrawFraction	Fraction of total water consumed daily as first draw	0.50000	unitless	0–84	E	Conservative value corresponding to consumption largely after four fours stagnation time was used (e.g., early morning or late afternoon).	E-6b, E-7
formula[AGE]	Lead intake from baby formula by age	E-4l	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5r
formulaConc	Lead concentration in formula	0.002433	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4l
formula_Consump[AGE]	Daily consumption of formula	45.153 22.975 0.797 0.000 0.000 0.000 0.000	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4l
FountainConc	Fountain water lead concentration	10.000	µg/L	0–84	E	Default assumption is that the drinking fountain has a lead-lined reservoir, but that consumption is not always first draw. Therefore, a value was selected from the range of 5–25 µg/L.	E-6b
FountainFraction	Fraction of total water consumed daily from water fountains	0.150	unitless	0–84	E	A default value was based on 4–6 trips to the water fountain at 40–50 mL per trip.	E-6b, E-7

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
fruitFraction	Fraction of fruit consumption that is derived from market basket (i.e., total fruit consumption - user-grown)	E-5c	unitless	0-84	E	Calculated value.	E-5g, E-5h
geo_mean	Geometric Mean	—	µg/dL	—	I	Calculated value.	—
GSD	Geometric Standard Deviation	1.600	unitless	0–84	E	U.S. EPA, 1994.	—
HCT0	Hematocrit at birth	0.450	%	0	I	Data from Silve *et al.* (1987); also Spector (1956) and Altman and Dittmer (1973).	B-7b,d
HomeFlushedConc	Home flushed water lead concentration	1.000	µg/L	0–84	E	Based on analysis of data from the American Water Works Service Co. (Marcus, 1989).	E-6b
HomeFlushedFraction	Fraction of home flushed water	0.000	unitless	0–84	E	Based on the assumption that the sum of all residential water fractions cannot exceed 1.	E-6b, E-7
HouseFraction	Fraction of dust exposure that is from residential dust	1.000	unitless	0-84	E	Based on the assumption that the sum of all residential dust fractions cannot exceed 1.	E-9.5, E-9b
INAIR[AGE]	Air lead intake at age range	E-3	µg/day	0–84	I	Product of average air lead concentration and ventilation rate.	E-3, U-4
InBeverage[AGE]	Lead intake from beverages at age range	E-5o	µg/day	0–84	I	Product of total beverage consumed, and the lead concentration in beverage(s).	E-4c, E-5o
InBread[AGE]	Lead intake from bread at age range	E-5m	µg/day	0–84	I	Product of total bread consumed, and the lead concentration in bread(s).	E-4c, E-5m
InCandy[AGE]	Lead intake from candy at age range	E-5p	µg/day	0–84	I	Product of total amount of candy consumed, and the lead concentration in the candy	E-4c, E-5p
InCanFruit[AGE]	Lead intake from canned fruit at age range	E-5d	µg/day	0–84	I	Product of the fraction of non-home grown fruits consumed daily, and lead intake from canned fruits when fruits are consumed only in canned form.	E-4b, E-5d
InCanVeg[AGE]	Lead intake from canned vegetables at age range	E-5b	µg/day	0–84	I	Product of the fraction of vegetables consumed daily as non-home grown, and lead intake from canned vegetables when vegetables are consumed only in canned form.	E-4b, E-5b
InDairy[AGE]	Lead intake from dairy products at age range	E-5j	µg/day	0–84	I	Product of total amount of dairy products consumed, and the lead concentration in the dairy products.	E-4c, E-5j

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
InDairy[AGE]	Lead intake from dairy products by age	E-5m	µg Pb/day	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-4c
INDIET[AGE]	Dietary lead intake at age range	E-4a *or* E-4b	µg/day	0–84	I	Two options are provided. Default option - Considers composite diet lead intake. Alternate option - Combines lead intake from several individual components of diet.	E-4a,b U-1a,g, U-2
IndoorConc[AGE]	Indoor air lead concentration at age range	E-1	$\mu g/m^3$	0–84	I	Algebraic expression of relationship.	E-1, E-2
indoorpercent	Ratio of indoor dust lead concentration to corresponding outdoor concentration	30.000	%	0–84	E	Based on homes near lead point sources. The default value is reported in OAQPS (U.S. EPA, 1989a, pp A-1) and is estimated by Cohen and Cohen (1980).	E-1
INDUST[AGE]	Household dust lead intake at age range	E-9a *or* E-9b,d	µg/day	0–84	I	Two options are provided. Default option - Assumes that all dust lead exposure is from the household. Alternate option - Considers dust lead exposure from several alternative sources as well.	E-9a,b,e U-1c,i, U-2
INDUSTA[AGE]	Lead intake from alternate dust sources at age range	E-9c *or* E-9d	µg/day	0–84	I	Two options are provided. Default option - Assumes that lead intake from alternate sources is zero. Alternate option - Combines lead intake from several alternate sources.	E-9c U-1d,j, U-2
infant[AGE]	Lead intake from infant food by age	E-4m	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5s

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
infantConc	Concentration of lead in infant food	0.004047	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4m
infant_Consump[AGE]	Daily consumption of infant (baby) food	131.767 66.905 1.634 0.000 0.000 0.000 0.000	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4m
InFish[AGE]	Lead intake from fish at age range	E-5h	µg/day	0–84	I	Product of total meat consumed daily, fraction of meat consumed a locally caught fish, and lead concentration in fish.	E-4b, E-5k
INFLOW[STEPS]	Lead input to ECF-plasma pool from organs	B-6a,b B-6.5a,b	µg/day	0–84	I	Tissue lead masses and blood lead concentration at birth.	B-6a,b B-6.5a,b
InFormula[AGE]	Lead intake from infant formula at age range	E-5r	µg/day	0–84	I	Product of total infant formula consumed daily, and the lead concentration in the formula.	E-4c, E-5r
InFrFruit[AGE]	Lead intake from non-home grown fresh fruits at age range	E-5e	µg/day	0–84	I	Product of the fraction of fruits consumed daily as non-home grown and lead intake from fresh fruits.	E-4b, E-5e
InFrVeg[AGE]	Lead intake from non-home grown fresh vegetables at age range	E-5c	µg/day	0–84	I	Product of the fraction of vegetables consumed daily as non-home grown and lead intake from fresh vegetables.	E-4b, E-5c
InGame[AGE]	Lead intake from game animal meat at age range	E-5i	µg/day	0–84	I	Product of total meat consumed daily, fraction of meat consumed as game animal meat, and lead concentration in game animal meat.	E-4b, E-5i
InHomeFruit[AGE]	Lead intake from home grown fruits at age range	E-5f	µg/day	0–84	I	Product of total amount of fruit consumed daily, fraction of fruit consumed as home grown, and lead concentration in home grown fruit.	E-4b, E-5f
InHomeVeg[AGE]	Lead intake from home grown vegetables at age range	E-5g	µg/day	0–84	I	Product of total amount of vegetable consumed daily, fraction of vegetables consumed as home grown, and lead concentration in home grown vegetables.	E-4b, E-5g
InInfant[AGE]	Lead intake from infant food at age range	E-5s	µg/day	0–84	I	Product of total amount of infant food consumed daily, and the lead concentration in the infant food.	E-4c, E-5s
InJuice[AGE]	Lead intake from juice at age range	E-5k	µg/day	0–84	I	Product of total amount of juice consumed daily, and the lead concentration in juice.	E-4c, E-5k

Note: I = internal model parameter; E = external, user-specified parameter

Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
InMeat[AGE]	Lead intake from non-game and non-fish meat at age range	E-5a	µg/day	0–84	I	Product of total amount of meat consumed daily, fraction of meat consumed as non-game and non-fish meat, and lead concentration in non-game and non-fish meat.	E-4b, E-5a
InNuts[AGE]	Lead intake from nuts at age range	E-5l	µg/day	0–84	I	Product of total amount of nuts consumed daily, and the lead concentration in nuts.	E-4c, E-5l
INOTHER[AGE]	Combined other sources of ingested lead, such as paint chips, ethnic medicines, etc., at age range	0.000	µg/day	0–84	I	Assumes no other sources of ingested lead.	U-1d,f,l, U-2
InOtherDiet[AGE]	Combined lead intake from dairy food, juice, nuts, beverage, pasta, bread, sauce, candy, infant and formula food at age range	E-4c	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	Sum of the amounts of lead ingested in food items not substituted by the calculation of exposure to lead in home grown fruits and vegetables, wild game or fish. U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-4b, E-4c
InPasta[AGE]	Lead intake from pasta at age range	E-5n	µg/day	0–84	I	Product of total amount of pasta consumed daily, and the lead concentration in pasta.	E-4c, E-5n
InSauce[AGE]	Lead intake from sauces at age range	E-5q	µg/day	0–84	I	Product of total amount of sauce consumed daily, and the lead concentration in sauce.	E-4c, E-5q
INSOIL[AGE]	Soil lead intake at age range	E-8a,b	µg/day	0–84	I	Simple combination of total amount of soil and dust ingested daily, fraction of this combined ingestion that is soil alone, and lead concentration in soil.	E-8a,b U-1e,k, U-2
INWATER[AGE]	Water lead intake at age range	E-6a *or* E-6b	µg/day	0–84	I	Two options are provided. Default option - Simple combination of water consumed daily and a constant water lead concentration. Alternate option - Water lead concentration depends on contribution from several individual sources of water.	E-6a,b U-1b,h, U-2

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
juices[AGE]	Lead intake from juices by age	E-4n	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5k
juiceConc	Concentration of lead in juice	0.004292	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4n
juice_Consump[AGE]	Daily consumption of juice	2.018 11.656 15.692 15.692 15.692 19.646 27.471	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4n
KPLECF[0]	total elimination rate from ECF-plasma pool	–	unitless	0–84			–
MCORT[STEPS]	Mass of lead in cortical bone at age range (solutions algorithm)	B-7e *and* B-9f	µg	0 *and* 0–84	I	0 months - Simple combination of an assumed bone to blood lead concentration ratio, blood lead concentration, and weight of cortical bone. Basis for value of bone to blood lead concentration ratio was human autopsy data (Barry, 1981). 0–84 months - Application of the Backward Euler solution algorithm to the system of differential equations (B-6a-B-6i in Table A-3). Both cases above assume that the cortical bone to blood lead concentration ratio is equal to the bone (composite) to blood lead concentration ratio.	B-6b,i, B-6.5b,i, B-7e, B-8d, B-9e,f

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
meat[AGE]	Lead intake from meat if no game meat or fish is consumed at age range	E-4o	µg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-4o, E-5a
meatConc	Concentration of lead in meat	0.007822	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4o
meat_consump[AGE]	Consumption of meat at age range	12.500 29.605 38.111 40.930 43.750 47.368 54.558	g/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	Quantity consumed based on Pennington (1983).	E-5k,l
meatFraction	Fraction of meat consumption that is derived from market basket (i.e., total meat consumption - user-caught fish and game)	E-5a	unitless	0–84	E	Calculated value.	E-5d
MKIDNEY[STEPS]	Mass of lead in kidney at age range (solutions algorithm)	B-7f *and* B-9c	µg	0 *and* 0–84	I	0 months - Simple combination of an assumed kidney to blood lead concentration ratio, blood lead concentration, and weight of kidney. Basis for the value of the kidney to blood lead concentration ratio was human autopsy data (Barry, 1981). 0–84 months - Application of the Backward Euler solution algorithm to the system of differential equations (B-6a-B-6i in Table A-3).	B-6b,f, B-6.5b,f, B-7f, B-8d, B-9c
MLIVER[STEPS]	Mass of lead in liver at age range (solutions algorithm)	B-7g *and* B-9b	µg	0 *and* 0–84	I	0 months - Simple combination of an assumed liver to blood lead concentration ratio, blood lead concentration, and weight of the liver. Basis for the value of the liver to blood lead concentration ratio was human autopsy data (Barry, 1981). 0–84 months - Application of the Backward Euler solution algorithm to the system of differential equations (B-6a-B-6i in Table A-3).	B-6b,e, B-6.5b,e, B-7g, B-8d, B-9b

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
MOTHER[STEPS]	Mass of lead in soft tissues at age range (solutions algorithm)	B-7h *and* B-9d	µg	0 *and* 0–84	I	0 months - Simple combination of an assumed soft tissue to blood lead concentration ratio, blood lead concentration, and weight of the soft tissues at birth. Basis for the value of soft tissue to blood lead concentration ratio was human autopsy data (Barry *et al.*, 1981), using total lead and total weight of other tissue. 0–84 months - Application of the Backward Euler solution algorithm to the system of differential equations (B-6a-B-6i in Table A-3).	B-6b,g, B-6.5b,g, B-7h, B-8d, B-9d
MPLASM[STEPS]	Mass of lead in plasma pool at age range (solutions algorithm)	B-7d *and* B-9g	µg	0 *and* 0–84	I	0 months - Simple combination of the mass of lead in blood and red blood cells. 0–84 months - Based on the assumption that the lead concentration in plasma-extracellular fluid (ECF) is equal to the lead concentration in the plasma.	B-7d, B-9g, B-10a
MPLECF[STEPS]	Mass of lead in plasma-extra-cellular fluid (plasma-ECF) at age range (solutions algorithm)	B-7b *and* B-8a	µg	0 *and* 0–84	I	0 months - Based on two assumptions. (1) masses of lead in plasma-ECF and red blood cells are in kinetic quasi-equilibrium, and; (2) lead concentration in the plasma-ECF is equal to lead concentration in the plasma. 0–84 months - Application of the Backward Euler solution algorithm to the system of differential equations (B-6a-B-6i in Table A-3).	B-6a,c–i, B-6.5a,c–i, B-7b,d, B-8a, B-9a,b,c,d,e,f,g
MRBC[STEPS]	Mass of lead in red blood cells at age range (solutions algorithm)	B-7c *and* B-9a	µg	0 *and* 0–84	I	0 months - Based on the assumption that the masses of lead in plasma-ECF and red blood cells are in kinetic quasi-equilibrium. 0–84 months - Application of the Backward Euler solution algorithm to the system of differential equations (B-6a –B-6i in Table A-3).	B-6b,d, B-6.5b,d, B-7c, B-8d, B-9a, B-10a

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
MTRAB[STEPS]	Mass of lead in trabecular bone at age range (solutions algorithm)	B-7i *and* B-9e	µg	0 *and* 0–84	I	0 months - Simple combination of an assumed bone to blood lead concentration ratio, blood lead concentration, and weight of trabecular bone. Basis for the value of bone to blood lead concentration ratio was human autopsy data (Barry, 1981). 0–84 months - Application of the Backward Euler solution algorithm to the system of differential equations (B-6a–B-6i in Table A-3). Both cases above assume that trabecular bone to blood lead concentration ratio is equal to bone (composite) to blood lead concentration ratio.	B-6b,h, B-6.5b,h, B-7i, B-8d, B-9e
multiply_factor	Ratio of in-door dust lead concentration to air lead concentration	100.000	µg /g per $\mu g/m^3$	0–84	E	Analyses of the 1983 East Helena study (in U.S. EPA, 1989a, Appendix B-8) suggest about 267 µg/g increment of lead in dust for each $\mu g/m^3$ lead in air. A much smaller factor of 100 µg/g dust lead per $\mu g/m^3$ is assumed for non-smelter community exposure. [Variable can exceed 100.]	E-11a,b
NBCORT	Variable for tissue lead masses and blood lead concentration at birth	0.400	unitless	0	I	Variable constant.	—
NBTRAB	Variable for tissue lead masses and blood lead concentration at birth	0.200	unitless	0	I	Variable constant.	—
nuts[AGE]	Lead intake from nuts by age	E-4p	mg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5l
nutsConc	Lead concentration in nuts	0.005798	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4p

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
nuts_Consump[AGE]	Daily consumption of nuts	0.087 0.962 0.875 0.962 0.962 0.962 0.875	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4p
NS	Length of time interval in solution algorithm	1/6	days	0–84	E	This user-selectable parameter is available mainly for adjusting the model run time to the speed of the computer. Newer, faster computers can run the model at the shortest timestep (15 min) in less than one minute. The default value, 4 hours, is based on a tradeoff between numerical accuracy of results and computer run-time. Except in the case of extreme exposure scenarios, there is no difference in the numerical accuracy at any user selectable value for timestep.	B-6.5a,d-i, B-7b,c, B-8a,c,d, B-9a-f, B-10b
OCCUP[AGE]	Dust lead intake from secondary occupation at age range	E-12a	Mg/day	0–84	I	Simple combination of amount of dust ingested, fraction of the total dust ingested as secondary occupational dust, and lead concentration in secondary occupational dust.	E-9c, E-12a
OccupConc	Secondary occupation dust lead concentration	1200.000	µg/g	0–84	E	Air Quality Criteria Document for Lead (U.S. EPA, 1986).	E-12a
OccupFraction	Fraction of total dust ingested as secondary occupation dust	0.000	unitless	0–84	E	The default condition is that there is no adult in the residence who works at a lead-related job.	E-9.5, E-12a
OTHER[AGE]	Dust lead intake from other home exposure source at age range	E-12e	Mg/day	0–84	I	e.g., Simple combination of amount of dust ingested daily, fraction of the total dust ingested as lead-based home paint, and lead concentration in lead-based home paint.	E-9c, E-12e
OtherConc	Lead concentration in house dust containing lead based paint	1200.000	µg/g	0–84	E	Air Quality Criteria Document for Lead (U.S. EPA, 1986).	E-12e
OtherFraction	Fraction of total dust ingested that results from lead- based home paint	0.000	unitless	0–84	E	The default is that lead paint is not actively contributing to house dust.	E-9.5 E-12e
other_intake	Lead intake from other media	0	µg/day	0–84	I	User defined.	—
OUTFLOW[STEPS]	Lead output from the ECF-plasma pool from organs	B-6a,c B-6.5a,c	Mg/day	0–84	I	Calculated value.	B-6a,c, B-6.5a,c

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
PAFD PAFF PAFP PAFS PAFW	Fraction of total absorption as passive absorption for dust, diet, paint, soil, and water at low dose	0.200	unitless	0–84	E	Based on in vitro everted rat intestine data (Aungst and Fung, 1981), reanalyses (Marcus, 1994) of infant baboon data (Mallon, 1983), and infant duplicate diet study (Sherlock and Quinn, 1986).	U-1a-l
pasta[AGE]	Lead intake from pasta by age	E-4q	Mg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5n
pastaConc	Concentration of lead in pasta	0.006163	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4q
pasta_Consump[AGE]	Daily consumption of lead	10.409 18.902 26.263 25.915 25.566 27.134 30.183	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4q
PBBLD0	Lead concentration in blood	B-7a	µg/dL	0	I	Based on 85% of maternal blood lead concentration (U.S. EPA, 1989a).	B-7a,b,c, e–i
PBBLDMAT	Maternal blood lead concentration at childbirth	1.0	µg/dL	adult	E	Based on TRW analysis of 1999-2002 NHANES data.	B-7a
PBBLOODEND[MONTH]	Lead concentration in blood at age range	B-10c	µg/dL	0–84	I	Simple combination of the blood lead concentrations determined in each iteration in the solution algorithm between the previous month and that month.	B-10c
RATBLPL	Ratio of lead mass in blood to lead mass in plasma-ECF	100.000	unitless	0–84	I	Based on the lower end of the 50–500 range for the red cell/plasma lead concentration ratio recommended in Diamond and O'Flaherty (1992a).	B-2b–d,g,i,k,m, B-3
RATFECUR	Ratio of endogenous fecal lead elimination rate to urinary lead elimination rate	0.750	unitless	0–84	I	Assume child ratio is larger than the adult ratio; values derived from a reanalysis of data from Ziegler *et al.* (1978) and Rabinowitz and Wetherill (1973).	B-1f

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
RATOUTFEC	Ratio of elimination rate via soft tissues to endogenous fecal lead elimination rate	0.750	unitless	0–84	I	Within the range of values derived from a reanalysis of data from Ziegler *et al.* (1978) and Rabinowitz and Wetherill (1973).	B-1g
RCORT0	Variable for tissue lead masses and blood lead concentration at birth	78.900	unitless	0	I	Variable constant.	—
RECSUM[STEPS]	Lead transfer time from plasma-ECF to all compartments except plasma	–	days	0-84	I	Calculated value	–
ResCoef[15]	Stores parameter values that are used in various equations in the biokinetic module	0.100 20.000 10.000 10.000 10.000 1.000 100.000 0.750 0.750 0.000 0.000 0.000 0.000 0.000 0.000	–		I	Calculated value	B-1a-g; B-2a; B-3
RKIDNEY0	Variable for tissue lead masses and blood lead concentration at birth	10.600	unitless	0	I	Variable constant.	—
RLIVER0	Variable for tissue lead masses and blood lead concentration at birth	13.000	unitless	0	I	Variable constant.	—
ROTHER0	Variable for tissue lead masses and blood lead concentration at birth	16.000	unitless	0	I	Variable constant.	—
RTRAB0	Variable for tissue lead masses and blood lead concentration at birth	51.200	unitless	0	I	Variable constant.	—
SATUPTAKE[MONTH]	Half saturation absorbable lead intake at age range	U-3	Mg/day	0–84	I	Assumed proportional to the weight of body. The coefficient of proportionality is assumed to depend on the estimate of the variable for a 24 month old and the corresponding body weight.	U-1g-l, U-3

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
SATUPTAKE2	Half saturation absorbable lead intake for a 2-year-old	100.000	Mg/day	0–84	E	Extrapolated from reanalysis of human infant data (Sherlock and Quinn, 1986) and infant baboon data (Mallon, 1983).	U-3
sauce[AGE]	Lead intake from sauces by age	E-4r	mg/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	I	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study. U. S. Food and Drug Administration Center for Food Safety and Applied Nutrition Office of Plant and Dairy Foods and Beverages (May 16, 2006). Available online: http://www.cfsan.fda.gov/~comm/tds-toc.html	E-5q
sauceConc	Concentration of lead in tomato sauce	0.010215	µg/kg	0–84	E	U.S. Food and Drug Administration (FDA). 2006. Total Diet Study.	E-4r
sauce_Consump[AGE]	Daily consumption of tomato sauce	1.647 4.784 5.569 6.902 8.157 8.235 8.235	grams/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Quantity consumed based on Pennington (1983).	E-4r
SCHOOL[AGE]	Dust lead intake from school at age range	E-12b	Mg/day	0–84	I	Simple combination of amount of dust ingested daily, the fraction of total dust ingested daily as school dust, and lead concentration in dust at school.	E-9c, E-12d
SchoolConc	Dust lead concentration at school	200.000	µg/g	0–84	E	By default, this dust lead concentration is set to the same as the residential dust lead concentration.	E-12b
SchoolFraction	Fraction of total dust ingested daily as school dust	0.000	unitless	0–84	E	Based on the default assumption that children are not in school.	E-9.5, E-12b
SECHOME[AGE]	Dust lead intake at secondary home at age range	E-12d	Mg/day	0–84	I	Simple combination of amount of dust ingested daily, fraction of dust ingested daily as secondary home dust, and lead concentration in dust at the secondary home.	E-9c, E-12d
SecHomeConc	Secondary home dust lead concentration	200.000	µg/g	0–84	E	Based on the assumption that dust lead concentration in a secondary home is the same as the default dust lead concentration in the primary home.	E-12d
SecHomeFraction	Fraction of total dust ingested daily as secondary home dust	0.000	unitless	0–84	E	Based on the default assumption that the child does not spend a significant amount of time in a secondary home.	E-9.5, E-12d

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
soil_content[AGE]	Outdoor soil lead concentration	200.000	µg/g	0–84	E	Upper bound value for a plausible urban background soil lead concentration (U.S. EPA, 1989a; HUD, 1990).	E-8b, E-11a
soil_indoor[AGE]	Indoor household dust lead concentration at age range	E-11a–d	µg/g	0–84	E	Under alternate dust sources model, based on assumption that both soil and outdoor air contribute to indoor dust lead.	E-9b,d, E-11a–d
soil_ingested[AGE]	Soil and dust (combined) consumption at age range	0.085 0.135 0.135 0.135 0.100 0.090 0.085	g/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Based on values reported in OAQPS report (U.S. EPA, 1989a, pp. A-16). The values reported were estimated for children, ages 12–48 mos, by several authors such as Binder *et al.* (1986) and Clausing *et al.* (1987). Sedman (1987) extrapolated these estimates to those for children, ages 0–84 months.	E-8a,b, E-9a,d,e, E-10
STEPS	Iterations per month	B-10b	days	—	I	Iteration interval.	B-10b
SUM1[STEPS]	Compartmental lead masses solution algorithm	B-8b	—	0–84	I	For Backward Euler calculation. Intermediate variables for Equations B-8b to B-8d.	B-8a,b
SUM2[STEPS]	Compartmental lead masses solution algorithm	B-8c	—	0–84	I	For Backward Euler calculation. Intermediate variables for Equations B-8b to B-8d.	B-8a,c
SUM3[STEPS]	Compartmental lead masses solution algorithm	B-8d	—	0–84	I	For Backward Euler calculation. Intermediate variables for Equations B-8b to B-8d.	B-8a,d
TBLBONE TBLBONE is not an array	Lead transfer time from blood to bone at age range	B-1e	days	0–84	I	24 months - Initialization is keyed to the 24 month old child, based in part on information from Heard and Chamberlain (1982) for adults, and O'Flaherty (1992). Once the concentration ratios are fixed, the exact value of this variable, within a wide range of possible values, has little effect on the blood lead value. 0–84 months - Assumed proportional body surface area. The coefficient of proportionality is assumed to depend on an estimate of the variable for a 24 month old and the corresponding body surface area. Also, it is assumed that body surface area varies as 1/3 power of the weight of body based on Mordenti (1986).	B-1e,h, B-2i,k

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
TBLFEC TBLFEC is not an array	Lead transfer time from blood to feces at age range	B-1f	days	0–84	I	Simple combination of an assumed ratio of urinary lead elimination rate to endogenous fecal lead elimination rate, and lead transfer time from blood to urine (See RATFECUR). The ratio of elimination rates was estimated for adults using Chamberlain *et al.* (1978) and Chamberlain (1985) and is assumed to apply to ages 0–84 months.	B-1f,g, B-2e,f
TBLKID TBLKID is not an array	Lead transfer time from blood to kidney at age range	10 *and* B-1d	days	0–84	I	24 months - Initialization is keyed to the 24 month old child, based in part on information from Heard and Chamberlain (1982) for adults, and O'Flaherty (1992). Once the concentration ratios are fixed, the exact value of this variable, within a wide range of possible values, has little effect on the blood lead value. 0–84 months - Assumed proportional body surface area. The coefficient of proportionality is assumed to depend on an estimate of the variable for a 24 month old and the corresponding body surface area. Also, it is assumed that body surface area varies as 1/3 power of the weight of body based on Mordenti (1986).	B-1d,g, B-2g,h
TBLLIV TBLLIV is not an array	Lead transfer time from blood to liver at age range	10 *and* B-1b	days	0–84	I	24 months - Initialization is keyed to the 24 month old child, based in part on information from Heard and Chamberlain (1982) for adults, and O'Flaherty (1992). Once the concentration ratios are fixed, the exact value of this variable, within a wide range of possible values, has little effect on the blood lead value. 0–84 months - Assumed proportional body surface area. The coefficient of proportionality is assumed to depend on an estimate of the variable for a 24 month old and the corresponding body surface area. Also, it is assumed that body surface area varies as 1/3 power of the weight of body based on Mordenti (1986).	B-1b, B-2d,e

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
TBLOTH TBLOTH is not an array	Lead transfer time from blood to other soft tissue at age range	10 *and* B-1c	days	0–84	I	24 months - Initialization is keyed to the 24 month old child, based in part on information from Heard and Chamberlain (1982) for adults, and O'Flaherty (1992). Once the concentration ratios are fixed, the exact value of this variable, within a wide range of possible values, has little effect on the blood lead value. 0–84 months - Assumed proportional body surface area. The coefficient of proportionality is assumed to depend on an estimate of the variable for a 24 month old and the corresponding body surface area. Also, it is assumed that body surface area varies as 1/3 power of the weight of body based on Mordenti (1986).	B-1c B-2m,n
TBLOUT TBLOUT is not an array	Lead transfer time from blood to elimination pool via soft tissue at age range	B-1g	days	0–84	I	Simple combination of an assumed ratio of elimination rate via soft tissues to endogenous fecal lead elimination rate, times the lead transfer time from blood to feces (See RATOUTFEC).	B-1g, B-2n,o

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
TBLUR TBLUR is not an array	Lead transfer time from blood to urine at age range	20 *and* B-1a	days	0–84	I	24 months - Assumed proportional to body surface area. The coefficient of proportionality is assumed to depend on an adult estimate for the variable and the corresponding body surface area. The adult estimate of 39 days was obtained using Araki *et al.* (1986a, 1986b, 1987), Assenato *et al.* (1986), Campbell *et al.* (1981), Carton *et al.* (1987), Chamberlain *et al.* (1978), Folashade *et al.* (1991), Heard and Chamberlain (1982), He *et al.* (1988), Kawaii *et al.* (1983), Kehoe (1961), Koster *et al.* (1989), Manton and Malloy (1983), Rabinowitz and Wetherill (1973), Rabinowitz *et al.* (1976), and Yokoyama *et al.* (1985). 0–84 months - Assumed proportional body surface area. The coefficient of proportionality is assumed to depend on an estimate of the variable for a 24 month old and the corresponding body surface area. Both cases above assume that (a) body surface area varies as 1/3 power of weight of body based on Mordenti (1986) and (b) respectively, 70 kg and 12.3 kg are standard adult and 24-month-old body weights based on Spector (1956). Since glomerular filtration rate (GFR) is proportional to body surface area for ages ≥24-month based on Weil (1955), surface area scaling is equivalent to scaling by GFR for ages ≥24 months.	B-1a,f, B-2c
TBONEBL TBONEBL is not an array	Lead transfer time from bone to blood at age range	B-1h	days	0–84	I	Based on the assumption that masses of lead in bone and blood are in kinetic quasi-equilibrium.	B-1h, B-2j,l
TCORTPL[MONTH]	Lead transfer time from cortical bone to plasma-ECF at age range	B-2l	days	0–84	I	Based on the assumption that the cortical and trabecular bone pools have similar lead kinetics for children younger than 84 months.	B-2l, B-6b,i, B-6.5b,i, B-8c,d, B-9f

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
time_out[AGE]	Time spent outdoors by age	1.000 2.000 3.000 4.000 4.000 4.000 4.000	Hr/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Values are reported in the OAQPS staff report (U.S. EPA, 1989a, p. A-2) and the IEUBK Technical Support Document (U.S. EPA, 1990a). The values have been derived from a literature review (Pope, 1985).	E-2
TKIDPL[MONTH]	Lead transfer time from kidney to plasma-ECF at age range	B-2h	days	0–84	I	Based on the assumption that the lead transfer time from kidney to blood is equal to the lead transfer time from kidney to plasma-ECF.	B-2h, B-6b,f, B-6.5b,f, B-8c,d, B-9c
TLIVALL	Lead transfer time from liver to all tissues for SUM2	B-9i	days	0–84	I	Average transition time from liver to all tissues from SUM2.	B-8c,d, B-9b,i
TLIVFEC[MONTH]	Lead transfer time from liver to feces at age range	B-2e	days	0–84	I	Based on the assumption that the masses of lead in liver and blood are in kinetic quasi-equilibrium.	B-2e,f, B-4i, B-6e, B-6.5e
TLIVPL[MONTH]	Lead transfer time from liver to plasma-ECF at age range	B-2f	days	0–84	I	Based on the assumption that the lead transfer time from liver to blood is equal to the lead transfer time from liver to plasma-ECF.	B-2e, B-6b,e, B-6.5b,e, B-8c,d, B-9i
TotAltSource	Fractional percent due to all secondary sources	None	%	—	I	Total fractional percent due to all secondary sources.	B8c,d B-9d,h
TOTHALL	Lead transfer time from other soft tissues to all tissues for SUM2	B-9h	days	0–84	I	Average transition time from other soft tissues to all tissues from SUM2.	B-8c,d, B-9d,h
TOTHOUT[MONTH]	Lead transfer time from soft tissues to elimination pool at age range	B-2o	days	0–84	I	Based on the assumption that the masses of lead in soft tissues and blood are in kinetic quasi-equilibrium.	B-2o, B-6g, B-6.5g, B-8c,d, B-9h

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
TOTHPL[MONTH]	Lead transfer time from soft tissues to plasma-ECF at age range	B-2n	days	0–84	I	Based on the assumption that the lead transfer time from soft tissues to blood is equal to the lead transfer time from soft tissues to plasma-ECF.	B-2n, B-6b,g, B-6.5b,g, B-8c,d, B-9h
TPLCORT[MONTH]	Lead transfer time from plasma-ECF to cortical bone at age range	B-2k	days	0–84	I	Based on the following assumptions: The rate at which lead leaves the plasma-ECF to reach the bone is proportional to the rate at which lead leaves the blood to reach the same pool. The cortical and trabecular bone pools have similar lead kinetics for children younger than 84 months. The cortical bone is 80% of the weight of bone based on Leggett *et al.* (1982).	B-2k, B-6c,i, B-6.5c,i, B-8b,c, B-9e,f
TPLKID[MONTH]	Lead transfer time from plasma-ECF to kidney at age range	B-2g	days	0–84	I	Based on the assumption that the rate at which lead leaves the plasma-ECF to reach the kidney is proportional to the rate at which lead leaves the blood to reach the same pool.	B-2g, B-6c,f, B-6.5c,f, B-8b,c, B-9c
TPLLIV[MONTH]	Lead transfer time from plasma-ECF to liver at age range	B-2d	days	0–84	I	Based on the assumption that the rate at which lead leaves the plasma-ECF to reach the liver is proportional to the rate at which lead leaves the blood to reach the same pool.	B-2d, B-6c,e, B-6.5c,e, B-8b, B-9b
TPLOTH[MONTH]	Lead transfer time from plasma-ECF to soft tissues at age range	B-2m	days	0–84	I	Based on the assumption that the rate at which lead leaves the plasma-ECF to reach the soft tissues is proportional to the rate which lead leaves the blood to reach the same pool.	B-2m, B-6c,g, B-6.5c,g, B-8b,c, B-9d
TPLRBC	Lead transfer time from plasma-ECF to red blood cells for SUM2	0.100	days	0–84	I	Initialization value of 0.1 was assigned as plausible nominal value reflecting best professional judgement on appropriate time scale for composite process of transfer of lead through the red blood cell membrane to lead binding components.	B-2a,b, B-2.5, B-7b,c

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
TPLRBC2	Lead transfer time from plasma-ECF to red blood cells constrained by the maximum capacity of red blood cell lead concentration at age range	B-2.5	days	0–84	I	Simple combination of the lead transfer time from plasma-ECF to red blood cells, and the ratio of red blood cell lead concentration to the corresponding maximum concentration. Based on Marcus (1985a) and reanalysis of infant baboon data.	B-2.5, B-6c,d, B-6.5c,d, B-8b,c, B-9a
TPLTRAB[MONTH]	Lead transfer time from plasma-ECF to trabecular bone at age range	B-2i	days	0–84	I	Based on the following assumptions: The rate at which lead leaves the plasma-ECF to reach the bone is proportional to the rate at which lead leaves the blood to reach the same pool. The cortical and trabecular bone pools have similar lead kinetics. The trabecular bone is 20% of the weight of bone based on Leggett *et al.* (1982).	B-2i, B-6c,h, B-6.5c,h, B-8b,c, B-9e
TPLUR[MONTH]	Lead transfer time from plasma-ECF to urine at age range	B-2c	days	0–84	I	Based on the assumption that the rate at which lead leaves the plasma-extra-cellular fluid to reach the urine pool is proportional to the rate at which lead leaves the blood to reach the same pool.	B-2c, B-6c, B-6.5c, B-8b
TRBCPL	Lead transfer time from red blood cells to plasma-ECF	B-2b	days	0–84	I	Based on the assumption that the transfer time out of red blood cells is similar at all ages, since mean red cell value is similar.	B-2b, B-6b,d, B-6.5b,d, B-7b,c, B-8c,d, B-9a
TTRABPL[MONTH]	Lead transfer time from trabecular bone to plasma-ECF fluid at age range	B-2j	days	0–84	I	Based on the assumption that the cortical and trabecular bone pools have similar lead kinetics for children younger than 84 months.	B-2j, B-6b,h, B-6.5b,h, B-8c,d, B-9e
TWA[AGE]	Time weighted average air lead concentration at age range	E-2	$\mu g/m^3$	0–84	I	Simple combination of outdoor and indoor air lead concentrations and the number of hours spent outdoors.	E-2, E-3
UPAIR[MONTH]	Air lead uptake at age range	U-4	Mg/day	0–84	I	Simple combination of media-specific lead intake and the corresponding net absorption coefficient.	U-4, U-5

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
UPDIET[MONTH]	Diet lead uptake at age range	U-1a	Mg/day	0–84	I	Simple combination of media-specific lead intake and the corresponding net absorption coefficient.	U-1a,g, U-5
UPDUSTA[MONTH]	Lead uptake rate from alternate sources at age range	U-1f	Mg/day	0–84	I	Simple combination of media-specific lead intake and the corresponding net absorption coefficient.	U-1d,j, U-5
UPDUST[MONTH]	Dust lead uptake at age range	U-1c	Mg/day	0–84	I	Simple combination of media-specific lead intake and the corresponding net absorption coefficient.	U-1c,i, U-5
UPSOIL[MONTH]	Soil lead uptake at age range	U-1e	Mg/day	0–84	I	Simple combination of media-specific lead intake and the corresponding net absorption coefficient.	U-1e,k, U-5
UPTAKE[MONTH]	Total lead uptake at age range	U-5	µg/mo	0–84	I	Simple combination of the media-specific daily lead uptake rates, translated to a monthly rate.	B-6a, B-6.5a, B-8a, U-5
UPWATER[MONTH]	Water lead uptake at age range	U-1b	Mg/day	0–84	I	Simple combination of media-specific lead intake and the corresponding net absorption coefficient.	U-1b,h, U-5
UserFishConc	Lead concentration in fish	0.000	µg/g	0–84	E	Based on the assumption that locally caught fish are consumed µg Pb/g fish as prepared.	E-5h
userFishFraction	Fraction of total meat consumed as fish	0.000	unitless	0–84	E	Based on the assumption that locally caught fish are consumed.	E-5a,h
UserFruitConc	Lead concentration in home grown fruits	0.000	µg/g	0–84	E	Based on the assumption that home grown fruits are consumed µg Pb/g fruit as prepared.	E-5f
userFruitFraction	Fraction of total fruits consumed as home grown fruits	0.000	unitless	0–84	E	Based on the assumption that home grown fruits are consumed.	E-5d,e,f
UserGameConc	Lead concentration in game animal meat	0.000	µg/g	0–84	E	Based on the assumption that game meat is consumed µg Pb/g game as prepared.	E-5i
userGameFraction	Fraction of total meat consumed as game animal meat excluding fish	0.000	unitless	0–84	E	Based on the assumption that game meat is consumed.	E-5a,i
UserVegConc	Lead concentration in home grown vegetables	0.000	µg/g	0–84	E	Based on the assumption that home grown vegetables are consumed µg Pb/g vegetables as prepared.	E-5g
userVegFraction	Fraction of total vegetables consumed as home grown vegetables	0.000	unitless	0–84	E	Based on the assumption that home grown vegetables are consumed.	E-5b,c,g
vary_indoor	Indoor soil lead concentration	—	µg/g	0–84	E	User specified.	—
vary_outdoor	Outdoor soil lead concentration	—	µg/g	0–84	E	User specified.	—

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
vegFraction	Fraction of vegetable consumption that is derived from market basket (i.e., total vegetable consumption - user-grown)	E-5b	unitless	0–84	E	Calculated value.	E-5e, E-5f
vent_rate[AGE]	Ventilation rate at age range	2.000 3.000 5.000 5.000 5.000 7.000 7.000	M^3/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Values are reported in the OAQPS report (U.S. EPA, 1989a, pp. A-3) and the IEUBK Technical Support Document (U.S. EPA 1990a). These estimates are based on body size in combination with smoothed data from Phalen *et al.* (1985).	E-3
VOLBLOOD[MONTH]	Volume of blood at age range	B-5a	dL	0–84	I	Statistical fitting of data from Silve *et al.* (1987), Spector (1956). and Altman and Dittmer (1973)	B-1h, B-2e,f,h,n,o, B-5a,d,e, m, B-10a
VOLECF[MONTH]	Volume of extra-cellular fluid (ECF) at age range	B-5d	dL	0–84	I	The volume of extracellular fluid that exchanges rapidly with plasma is estimated to be 73% of the blood volume based on Rabinowitz (1976). This additional volume of distribution is assumed to be the volume of the extra-cellular fluid pool, which is the difference between the volume of the distribution and the blood volume.	B-5d, B-9g
VOLPLASM[MONTH]	Volume of plasma at age range	B-5c	dL	0–84	I	Statistical fit to VOLBLOOD(MONTH) - VOLRBC(MONTH)	B-5c, B-7b,c, B-9g
VOLRBC[MONTH]	Volume of red blood cells at age range	B-5b	dL	0–84	I	Statistical fit to hematocrit × blood volume.	B-2.5, B-5b
water_consumption[AGE]	Daily amount of water consumed at age range	0.200 0.500 0.520 0.530 0.550 0.580 0.590	L/day	0–11 12–23 24–35 36–47 48–59 60–71 72–84	E	Exposure Factors Handbook (U.S. EPA, 1989b).	E-6a,b

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Parameter Name	Description	Default Value or Equation Number	Units	Age Range (mos)	I or E	Basis for Values/Equations	Equation Where Used
weight_soil	Percentage of total soil and dust ingestion that is soil	45.000	%	0–84	E	IEUBK Guidance Manual, Section 2.3 (U.S. EPA, 1994).	E-8a,b, E-9a,d,e, E-10
WTBLOOD[MONTH]	Weight of blood at age range	B-5m	kg	0–84	I	Based on a blood density of 1.056 kg/L (Spector 1956).	B-5l,m
WTBODY[MONTH]	Weight of body at age range	B-5f	kg	0–84	I	Statistical fitting of data from Silve *et al.* (1987); also Spector (1956) and Altman and Dittmer (1973). Also, body weight of 24 month old is assumed to be 12.3 kg (Spector 1956).	B-1a–e, B-5f,g,l, U-3
WTBONE[MONTH]	Weight of bone at age range	B-5g	kg	0–84	I	WTBONE[MONTH] = 0.111 * WTBODY[MONTH] [MONTH] ≤12 months = 0.838 + 0.02 * [MONTH]	B-5g–i
WTCORT[MONTH]	Weight of cortical bone at age range	B-5h	kg	0–84	I	Assumed to be 80% of the weight of the bone based on Leggett *et al.* (1982).	B-1h, B-5h,l, B-7e
WTECF[MONTH]	Weight of extra-cellular fluid (ECF) in lead volume distribution at age range	B-5e	kg	0–84	I	Based on an assumed ECF density approximately the same as water, of 1.0 kg/L.	B-5e,l
WTKIDNEY[MONTH]	Weight of kidney at age range	B-5j	kg	0–84	I	Statistical fitting of data from Silve *et al.* (1987); also Spector (1956) and Altman and Dittmer (1973). Also, body weight of 24 month old is assumed to be 12.3 kg (Spector, 1956).	B-2h, B-5j,l, B-7f
WTLIVER[MONTH]	Weight of liver at age range	B-5k	kg	0–84	I	Statistical fitting of data from Silve *et al.* (1987); also Spector (1956) and Altman and Dittmer (1973). Also, body weight of 24 month old is assumed to be 12.3 kg (Spector, 1956).	B-2e,f, B-5k,l, B-7g
WTOTHER[MONTH]	Weight of other tissues at age range	B-5l	kg	0–84	I	Simple combination of the weight of body and the weights of kidney, liver, bone, blood, and extra-cellular fluid.	B-2n,o, B-5l, B-7h
WTTRAB[MONTH]	Weight of trabecular bone at age range	B-5i	kg	0–84	I	Assumed to be 20% of the weight of the bone based on Leggett *et al.* (1982).	B-1h,l, B-5i,l, B-7i

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