Table K-1-1. Parameter defaults and assumptions for EBSL calculations.

Parameter	EBSL Soil/Sediment Calculations	EBSL Water Calculations
PV	Herbivores – 100 minus PS Insectivores – 0 Carnivores – 0 Omnivores - PV from literature minus PS/2	N/A
PP	Herbivores – 0 Insectivores – 100 minus PS Carnivores – 100 minus PS Omnivores - PP from literature minus PS/2.	N/A
PS	The highest value (i.e., greatest exposure) was selected from species within functional group. Individual species evaluated using values as presented.	N/A
IR	Allometric equations from Nagy (1987). The largest IR/BW ratio was used from the species within a functional group.	N/A
WI	N/A	Allometric equations for birds and mammals (EPA 1993). The largest WI/BW ratio was selected from species within each functional group.
BW	The smallest BW/IR ratio was selected from species within each functional group.	The smallest BW/WI ratio (smallest BW) was selected from species within each functional group
ED	Defaulted to 1.	Defaulted to 1.
SUF	Defaulted to 1.	Defaulted to 1.

Table K-1-2. Parameter input values for EBSL calculations.

Functional Groups	PP	PV	PS	SUF	ED	IR (kg/day)	BW (kg)
Amphibians (A232)	9.41E-01	0.00E+00	5.90E-02	1.00E-00	1.00E-00	6.49E-05	8.00E-03
Avian herbivores (AV121)	0.00E+00	9.90E-01	1.00E-02	1.00E-00	1.00E-00	3.50E-03	1.29E-02
Avian herbivores (AV122)	0.00E+00	9.07E-01	9.30E-02	1.00E-00	1.00E-00	1.46E-03	3.50E-03
Avian herbivores (AV132)	0.00E+00	8.20E-01	1.80E-01	1.00E-00	1.00E-00	1.07E-02	7.46E-02
Avian herbivores (AV142)	0.00E+00	9.18E-01	8.20E-02	1.00E-00	1.00E-00	2.75E-02	3.16E-01
Trumpeter swan	0.00E+00	9.18E-01	8.20E-02	1.00E-00	1.00E-00	2.75E-01	1.09E+01
Avian herbivores (AV143)	0.00E+00	9.18E-01	8.20E-02	1.00E-00	1.00E-00	2.92E-02	3.47E-01
Avian insectivores (AV210)	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	2.90E-03	1.00E-02
Black tern	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	9.84E-03	6.53E-02
Avian insectivores (AV210A)	9.70E-01	0.00E+00	3.00E-02	1.00E-00	1.00E-00	3.89E-03	1.46E-02
Avian insectivores (AV221)	9.70E-01	0.00E+00	3.00E-02	1.00E-00	1.00E-00	1.99E-03	6.65E-03
Avian insectivores (AV222)	9.07E-01	0.00E+00	9.30E-02	1.00E-00	1.00E-00	3.07E-03	1.09E-02
Avian insectivores (AV222A)	9.07E-01	0.00E+00	9.30E-02	1.00E-00	1.00E-00	2.82E-03	1.00E-02
Avian insectivores (AV232)	8.20E-01	0.00E+00	1.80E-01	1.00E-00	1.00E-00	1.12E-03	2.32E-02
Avian insectivores (AV233)	8.20E-01	0.00E+00	1.80E-01	1.00E-00	1.00E-00	4.78E-03	2.15E-02
White-faced ibis	8.90E-01	0.00E+00	1.10E-01	1.00E-00	1.00E-00	4.27E-02	6.22E-01
Avian insectivores (AV241)	8.20E-01	0.00E+00	1.80E-01	1.00E-00	1.00E-00	6.41E-03	3.38E-02
Avian insectivores (AV242)	8.20E-01	0.00E+00	1.80E-01	1.00E-00	1.00E-00	1.13E-02	8.10E-02
Avian carnivores (AV310)	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	1.61E-02	1.39E-01
Northern goshawk	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	6.00E-02	1.05E-00
Peregrine falcon	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	4.96E-02	7.82E-01
Avian carnivores (AV322)	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	7.44E-03	4.25E-02
Bald eagle	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	1.60E-01	4.74E-00
Ferruginous hawk	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	6.19E-02	1.10E-00
Loggerhead shrike	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	7.44E-03	4.25E-02
Avian carnivores (AV322A)	9.70E-01	0.00E+00	3.00E-02	1.00E-00	1.00E-00	1.73E-02	1.55E-01
Burrowing Owl	9.70E-01	0.00E+00	3.00E-02	1.00E-00	1.00E-00	1.73E-02	1.55E-01
Avian carnivores (AV333)	8.20E-01	0.00E+00	1.80E-01	1.00E-00	1.00E-00	1.84E-02	1.71E-01
Avian carnivores (AV342)	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	4.64E-02	7.06E-01
Avian omnivores (AV422)	6.27E-01	2.80E-01	9.30E-02	1.00E-00	1.00E-00	1.13E-02	8.02E-02
Avian omnivores (AV432)	5.70E-01	2.50E-01	1.80E-01	1.00E-00	1.00E-00	2.75E-02	3.16E-01
Avian omnivores (AV433)	5.70E-01	2.50E-01	1.80E-01	1.00E-00	1.00E-00	5.33E-02	8.74E-01

Table K-1-2. (continued).

Functional Groups	PP	PV	PS	SUF	ED	IR (kg/day)	BW (kg)
Avian omnivores (AV442)	6.20E-01	2.70E-01	1.10E-01	1.00E-00	1.00E-00	4.41E-02	6.54E-01
Mammalian herbivores (M121)	0.00E+00	9.80E-01	2.00E-02	1.00E-00	1.00E-00	3.14E-01	5.80E-00
Mammalian herbivores (M122)	0.00E+00	9.37E-01	6.30E-02	1.00E-00	1.00E-00	3.30E-03	1.10E-02
Mammalian herbivores (M122A)	0.00E+00	9.23E-01	7.70E-02	1.00E-00	1.00E-00	4.27E-03	1.57E-02
Pygmy rabbit	0.00E+00	9.80E-01	2.00E-02	1.00E-00	1.00E-00	4.53E-02	4.04E-01
Mammalian herbivores (M123)	0.00E+00	9.23E-01	7.70E-02	1.00E-00	1.00E-00	1.51E-02	8.89E-02
Mammalian insectivores (M210)	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	1.43E-03	9.03E-03
Mammalian insectivores (M210A)	9.80E-01	0.00E+00	2.00E-02	1.00E-00	1.00E-00	1.43E-03	4.65E-03
Townsend's western big-eared bat	9.90E-01	0.00E+00	1.00E-02	1.00E-00	1.00E-00	2.37E-03	1.10E-02
Small-footed myotis	9.90E-01	0.00E+00	1.00E-02	1.00E-00	1.00E-00	1.44E-03	4.69E-03
Long-eared myotis	9.90E-01	0.00E+00	1.00E-02	1.00E-00	1.00E-00	1.77E-03	6.65E-03
Mammalian insectivores (M222)	9.76E-01	0.00E+00	2.40E-02	1.00E-00	1.00E-00	1.66E-03	6.00E-03
Mammalian carnivore (M322)	9.23E-01	0.00E+00	7.70E-02	1.00E-00	1.00E-00	1.66E-02	1.78E-01
Mammalian omnivores (M422)	8.06E-01	1.00E-01	9.40E-02	1.00E-00	1.00E-00	3.06E-03	1.70E-02
Mammalian omnivores (M422A)	8.06E-01	1.00E-01	9.40E-02	1.00E-00	1.00E-00	2.60E-01	5.05E-00
Reptilian insectivores (R222)	9.76E-01	0.00E+00	2.40E-02	1.00E-00	1.00E-00	5.60E-05	6.61E-03
Sagebrush lizard	9.76E-01	0.00E+00	2.40E-02	1.00E-00	1.00E-00	5.60E-05	6.61E-03
Reptilian carnivores (R322)	9.52E-01	0.00E+00	4.80E-02	1.00E-00	1.00E-00	6.80E-03	1.50E-02
Plants	0.00E+00	0.00E+00	1.00E-00	1.00E-00	1.00E-00		

Table K-1-3. Summary of EBSL input values and literature sources for dietary parameters (PP, PV and PS).

Functional Groups	PP	PV	PS	PS Model Species[a]
Amphibians (A232)	9.41E-01	0.00E+01	5.90E-02	Eastern painted turtle
Avian herbivores (AV121)	0.00E+00	9.90E-01	1.00E-02	Estimated
Avian herbivores (AV122)	0.00E+00	9.07E-01	9.30E-02	Wild turkey
Avian herbivores (AV132)	0.00E+00	8.20E-01	1.80E-01	Western sandpiper
Avian herbivores (AV142)	0.00E+00	9.18E-01	8.20E-02	Canada goose
Avian herbivores (AV143)	0.00E+00	9.18E-01	8.20E-02	Canada goose
Trumpeter swan	0.00E+00	9.18E-01	8.20E-02	Canada goose
Avian insectivores (AV210)	9.80E-01	0.00E+00	2.00E-02	Estimated
Black tern	7.50E-01	0.00E+00	2.00E-02	Estimated
Avian insectivores (AV210A)	9.70E-01	0.00E+00	3.00E-02	Burrowing owl
Avian insectivores (AV221)	9.70E-01	0.00E+00	3.00E-02	Burrowing owl
Avian insectivores (AV222)	9.07E-01	0.00E+00	9.30E-02	Wild turkey
Avian insectivores (AV222A)	9.07E-01	0.00E+00	9.30E-02	Wild turkey
Avian insectivores (AV232)	8.20E-01	0.00E+00	1.80E-01	Western sandpiper
Avian insectivores (AV233)	8.20E-01	0.00E+00	1.80E-01	Western sandpiper
White-faced ibis	8.90E-01	0.00E+00	1.10E-01	Western sandpiper
Avian insectivores (AV241)	8.20E-01	0.00E+00	1.80E-01	Western sandpiper
Avian insectivores (AV242)	8.20E-01	0.00E+00	1.10E-01	Wood duck
Avian carnivores (AV310)	9.80E-01	0.00E+00	2.00E-02	Wood duck
Northern goshawk	9.80E-01	0.00E+00	2.00E-02	Estimated
Peregrine falcon	9.80E-01	0.00E+00	2.00E-02	Estimated
Avian carnivores (AV322)	9.80E-01	0.00E+00	2.00E-02	Estimated
Bald eagle	9.80E-01	0.00E+00	2.00E-02	Estimated
Ferruginous hawk	9.80E-01	0.00E+00	2.00E-02	Estimated
Loggerhead shrike	9.80E-01	0.00E+00	2.00E-02	Estimated from burrowing owl
Avian carnivores (AV322A)	9.70E-01	0.00E+00	3.00E-02	Burrowing owl
Burrowing Owl	9.70E-01	0.00E+00	3.00E-02	Burrowing owl
Avian carnivores (AV333)	8.20E-01	0.00E+00	1.80E-01	Western sandpiper
Avian carnivores (AV342)	9.80E-01	0.00E+00	2.00E-02	NOT MODELED
Avian omnivores (AV422)[b]	6.27E-01	2.80E-01	9.30E-02	Wild turkey
Avian omnivores (AV432)[b]	5.70E-01	2.50E-01	1.80E-01	Western sandpiper
Avian omnivores (AV433)[b]	5.70E-01	2.50E-01	1.80E-01	Western sandpiper
Avian omnivores (AV442)[b]	6.20E-01	2.70E-01	1.10E-01	Wood duck
Mammalian herbivores (M121)	0.00E+00	9.80E-01	2.00E-02	Mule deer
Mammalian herbivores (M122)	0.00E+00	9.37E-01	6.30E-02	Black-tailed jackrabbit[c]
Mammalian herbivores (M122A)	0.00E+00	9.23E-01	7.70E-02	Black-tailed prairie dog
Pygmy rabbit	0.00E+00	9.80E-01	2.00E-02	Black-tailed prairie dog
Mammalian herbivores (M123)	0.00E+00	9.23E-01	7.70E-02	Black-tailed prairie dog
Mammalian insectivores[d] (M210)	9.80E-01	0.00E+00	2.00E-02	Beetle specialist
Mammalian insectivores[d] M210A)	9.80E-01	0.00E+00	2.00E-02	Beetle specialist
Townsend's western big-eared bat	9.90E-01	0.00E+00	1.00E-02	Moth specialist

Table K-1-3. (continued).

Functional Groups	PP	PV	PS	PS Model Species[a]
Small-footed myotis	9.90E-01	0.00E+00	1.00E-02	Moth specialist
Long-eared myotis	9.90E-01	0.00E+00	1.00E-02	Beetle specialist
Mammalian insectivores (M222)	9.76E-01	0.00E+00	2.40E-02	Meadow vole
Mammalian carnivore (M322)	9.23E-01	0.00E+00	7.70E-02	Black-tailed prairie dog
Mammalian omnivores[e] (M422)	8.06E-01	1.00E-01	9.40E-02	Raccoon
Mammalian omnivores[e] (M422A)	8.06E-01	1.00E-01	9.40E-02	Fox
Reptilian insectivores (R222)	9.76E-01	0.00E+00	2.40E-02	Meadow vole
Sagebrush lizard	9.76E-01	0.00E+00	2.40E-02	Meadow vole
Reptilian carnivores (R322)	9.52E-01	0.00E+00	4.80E-02	Fox plus 2%

a. From Beyer et al., 1994 unless otherwise noted.

b. Dietary composition percent prey and percent vegetation based on avian models from EPA 1993.

c. Arthur and Gates 1988.

d. Soil ingestion rates for bats were estimated based on primary prey life histories – Beetle strategists = 2% and moth strategists = 1%.

e. Dietary composition 90% prey and 10%vegetation based on INEEL data for the coyote (Johnson and Hansen 1979).

Table K-1-4. Summary of EBSL body weight input values.

Functional Groups	BW (kg)	Representative Species	Reference
Amphibians (A232)	8.00E-03	Boreal chorus frog	Steenhof 1983 (calculated from SVL[a] for spadefoot toads – 0.6 SVL)
Avian herbivores (AV121)	1.29E-02	American goldfinch	Dunning 1993 (mean adult)
Avian herbivores (AV122)	3.50E-03	Rufous hummingbird	Dunning 1993 (mean adult)
Avian herbivores (AV132)	7.46E-02	Sora	Dunning 1993 (mean adult)
Avian herbivores (AV142)	3.16E-01	Green-winged teal	Steenhof 1983 (mean adult)
Avian herbivores (AV143)	3.47E-01	Cinnamon teal	Steenhof 1983 (mean adult)
Trumpeter swan	1.09E+01	Trumpter swan	Dunning 1993 (mean adult)
Avian insectivores (AV210)	1.00E-02	Western flycatcher	Dunning 1993 (mean adult)
Black tern	6.53E-02	Black tern	Dunning 1993 (mean adult)
Avian insectivores (AV210A)	1.46E-02	Bank swallow	Dunning 1993 (mean adult)
Avian insectivores (AV221)	6.65E-03	Ruby-crowned kinglet	Dunning 1993 (mean adult)
Avian insectivores (AV222)	1.09E-02	House wren	Dunning 1993 (mean adult)
Avian insectivores (AV222A)	1.00E-02	Canyon wren	Steenhof 1983 (mean adult)
Avian insectivores (AV232)	2.32E-02	Least sandpiper	Dunning 1993 (mean adult)
Avian insectivores (AV233)	2.15E-02	Willet	Dunning 1993 (mean adult)
White-faced ibis	6.22E-01	White-faced ibis	Dunning 1993 (mean adult)
Avian insectivores (AV241)	8.10E-02	Lesser yellowlegs	Dunning 1993 (mean adult)
Avian insectivores (AV242)	2.12E-01	Bonaparte's gull	Dunning 1993 (mean adult)
Avian carnivores (AV310)	1.39E-01	Sharp-shinned hawk	Dunning 1993 (mean adult)
Northern goshawk	1.05E-00	Northern goshawk	Dunning 1993 (mean adult)
Peregrine falcon	7.82E-01	Peregrine falcon	Dunning 1993 (mean adult)
Avian carnivores (AV322)	4.25E-02	Loggerhead shrike	Fraser and Luukkonen 1986 (mean adult)
Bald eagle	4.74E-00	Bald eagle	Dunning 1993 (mean adult)
Ferruginous hawk	1.10E-00	Ferruginous hawk	Steenhof 1993 (mean adult)
Loggerhead shrike	4.25E-02	Loggerhead shrike	Fraser and Luukkonen 1986 (mean adult)
Avian carnivores (AV322A)	1.55E-01	Burrowing owl	Dunning 1993 (mean adult)
Burrowing Owl	1.55E-01	Burrowing owl	Dunning 1993 (mean adult)
Avian carnivores (AV333)	1.71E-01	Greater yellowlegs	Dunning 1993 (mean adult)
Avian carnivores (AV342)	7.06E-01	American bittern	Dunning 1993 (mean adult)
Avian omnivores (AV422)	8.02E-02	Scrub jay	Dunning 1993 (mean adult)
Avian omnivores (AV432)	3.16E-01	American avocet	Dunning 1993 (mean adult)
Avian omnivores (AV433)	8.74E-01	Great egret	Dunning 1993 (mean adult)
Avian omnivores (AV442)	6.54E-01	American coot	Steenhof 1983 (mean adult
Mammalian herbivores (M121)	5.80E-00	American porcupine	Steenhof 1983 (mean adult)
Mammalian herbivores (M122)	1.10E-02	Western harvest mouse	Steenhof 1983 (mean adult)
Mammalian herbivores (M122A)	1.57E-02	Sagebrush vole	Mullican 1985 (median adult)
Pygmy rabbit	4.04E-01	Pygmy rabbit	Arthur and Markham 1978 (mean adult)
Mammalian herbivores (M123)	8.89E-02	Northern pocket gopher	Wakely 1978 (mean adult)
Mammalian insectivores (M210)	9.03E-03	Silver-haired bat	Barclay et al. 1988 (mean adult)

Table K-1-4. (continued).

Functional Groups	BW (kg)	Representative Species	Reference
Mammalian insectivores (M210A)	4.65E-03	California myotis	Black 1974 (mean adult)
Townsend's western big-eared bat	1.10E-02	Townsend's western big-eared bat	Burt and Grossenheider 1980 (median adult)
Small-footed myotis	4.69E-03	Small-footed myotis	Barclay et al. 1988 (mean adult)
Long-eared myotis	6.65E-03	Long-eared myotis	Barclay et al. 1988 (mean adult)
Mammalian insectivores (M222)	6.00E-03	Merriam's shrew	Steenhof 1983 (mean adult)
Mammalian carnivore (M322)	1.78E-01	Long-tailed weasel	Steenhof 1983 (mean adult)
Mammalian omnivores (M422)	1.70E-02	House mouse	Burt and Grossenheider 1980 (median adult)
Mammalian omnivores (M422A)	5.05E-00	Red fox	Lindstedt et al. 1986 (mean adult)
Reptilian insectivores (R222)	6.61E-03	Sagebrush lizard	Burkholder 1978 (mean adult)
Sagebrush lizard	6.61E-03	Sagebrush lizard	Burkholder 1978 (mean adult)
Reptilian carnivores (R322)	1.50E-02	Night snake	Steenhof 1983 (mean adult)

a. SVL = snout to vent length.

K-1.2.3 Food and Water Ingestion Rates (IR, WI)

Food/prey ingestion rates (IR) for most INEEL species were calculated using allometric equations given in Nagy (1987). Food intake rates (grams dry weight per day) for passerine birds, nonpasserine birds, rodents, herbivores, all other mammals, and insectivorous reptiles were estimated using the following allometric equations (Nagy 1987).

$$\text{Food intake rate} = 0.398\ BW^{0.850}\ \text{(passerines)} \quad \text{(K-23)}$$

$$\text{Food intake rate} = 1.110\ BW^{0.445}\ \text{(desert bird)} \quad \text{(K-24)}$$

$$\text{Food intake rate} = 0.648\ BW^{0.651}\ \text{(nonpasserines)} \quad \text{(K-25)}$$

$$\text{Food intake rate} = 0.583\ BW^{0.585}\ \text{(rodents)} \quad \text{(K-26)}$$

$$\text{Food intake rate} = 0.577\ BW^{0.727}\ \text{(herbivores)} \quad \text{(K-27)}$$

$$\text{Food intake rate} = 0.15\ BW^{0.874}\ \text{(desert mammals)} \quad \text{(K-28)}$$

$$\text{Food intake rate} = 0.013\ BW^{0.773}\ \text{(insectivorous reptiles)} \quad \text{(K-29)}$$

where BW = body weight in grams.

The original equation for rodents (K-26) has been modified slightly (Nagy 1987), based on reporting errors discovered in that report. An equation for ingestion rates for carnivorous reptiles was constructed using data reported by Diller and Johnson (1988).

Food intake rate = 0.01 $BW^{1.5}$ (carnivorous reptiles) (K-30)

where

BW = body weight in kilograms.

These equations were applied to estimate the ingestion rate (g dry weight/day) as a function of body weight (see Section K-2). The application of individual equations for species and groups varies according to taxonomic Class and/or Order and in some cases, on habitat (e.g., aquatic species). In cases where more than one of Nagy's (1987) equations could be applied to a functional group, such as all mammals or desert rodents, the larger of the two rates was applied. For functional groups in which mixed species occur, intake rates were calculated using the most representative or generic equation returning the largest IR. Finalized ingestion rates for functional groups and individual species are presented in Table K-1-5.

A cursory comparison of food ingestion values generated using Nagy's (1987) equations to a few experimental values from the literature indicate that the equations may substantially underestimate ingestion rates for some species.

K-1.2.4 Exposure Duration

Exposure duration (ED) represents the fraction of year an animal spends in the affected area. Because EBSL screening values were designed to be conservative, ED was assumed to be 1 for all receptors, assuming 100% of their time is spent in the assessment area.

K-1.2.5 Site Use Factor

The site use factor (SUF) represents the proportion of a species home range that overlaps the area of contamination. An SUF of 1 indicates that the home range is less than or equal to the area of contaminant exposure. For EBSL screening, the SUF was assumed to be 1 (100% use occurs in the area of contamination) for all groups and species (see VanHorn et al. 1995).

K-1.2.6 Bioaccumulation Factors

The uptake of contaminants in the terrestrial food chain is important for realistically calculating exposure to contamination. These contaminant-specific factors are referred to in the literature as uptake factors or plant uptake factors (PUFs) for plants and food-chain transfer coefficients or factors for wildlife. The PUF is the plant tissue concentration of the contaminant divided by the soil or sediment concentration. The food-chain transfer factor is the animal tissue concentration of a contaminant divided by the concentration in its food. To estimate the tissue levels of contaminants in prey, the PUF was multiplied by the transfer factors to derive a "bioaccumulation factor" (BAF), which is the concentration of a contaminant in the tissues of an animal divided by the soil or sediment concentration. The BAF accounts for all ingestion exposure routes. For example, the BAF for a herbivorous small mammal is the PUF times the plant-to-herbivore transfer coefficient. Multiplying the small mammal BAF times the concentration of a contaminant in soil provides an estimate of the tissue levels of the contaminant in small mammals. This tissue level may then be used to estimate exposure for the carnivore/omnivore functional groups that are predators of small mammals.

Table K-1-5. Summary of EBSL input values and equations for calculation of food ingestion for groups and individuals.

Functional Groups	IR (kg/day)	Nagy Equation
Amphibians (A232)	6.49E-05	reptile insectivores
Avian herbivores (AV121)	3.50E-03	passerines
Avian herbivores (AV122)	1.46E-03	all birds
Avian herbivores (AV132)	1.07E-02	all birds
Avian herbivores (AV142)	2.75E-02	all birds
Trumpeter swan	2.75E-01	all birds
Avian herbivores (AV143)	2.92E-02	all birds
Avian insectivores (AV210)	2.90E-03	all birds
Black tern	9.84E-03	all birds
Avian insectivores (AV210A)	3.89E-03	passerines
Avian insectivores (AV221)	1.99E-03	passerines
Avian insectivores (AV222)	3.07E-03	all birds
Avian insectivores (AV222A)	2.82E-03	passerines
Avian insectivores (AV232)	1.12E-03	all birds
Avian insectivores (AV233)	4.78E-03	all birds
White-faced ibis	4.27E-02	all birds
Avian insectivores (AV241)	6.41E-03	all birds
Avian insectivores (AV242)	1.13E-02	all birds
Avian carnivores (AV310)	1.61E-02	all birds
Northern goshawk	6.00E-02	all birds
Peregrine falcon	4.96E-02	all birds
Avian carnivores (AV322)	7.44E-03	all birds
Bald eagle	1.60E-01	all birds
Ferruginous hawk	6.19E-02	all birds
Loggerhead shrike	7.44E-03	all birds
Avian carnivores (AV322A)	1.73E-02	all birds
Burrowing Owl	1.73E-02	all birds
Avian carnivores (AV333)	1.84E-02	all birds
Avian carnivores (AV342)	4.64E-02	all birds
Avian omnivores (AV422)	1.13E-02	all birds
Avian omnivores (AV432)	2.75E-02	all birds
Avian omnivores (AV433)	5.33E-02	all birds
Avian omnivores (AV442)	4.41E-02	all birds
Mammalian herbivores (M121)	3.14E-01	mammal herbivore
Mammalian herbivores (M122)	3.30E-03	mammal herbivore

Table K-1-5. (continued).

Functional Groups	IR (kg/day)	Nagy Equation
Mammalian herbivores (M122A)	4.27E-03	mammal herbivore
Pygmy rabbit	4.53E-02	mammal herbivore
Mammalian herbivores (M123)	1.51E-02	all mammals
Mammalian insectivores (M210)	1.43E-03	rodents
Mammalian insectivores (M210A)	1.43E-03	rodents
Townsend's western big-eared bat	2.37E-03	rodents
Small-footed myotis	1.44E-03	rodents
Long-eared myotis	1.77E-03	rodents
Mammalian insectivores (M222)	1.66E-03	rodents
Mammalian carnivore (M322)	1.66E-02	all mammals
Mammalian omnivores (M422)	3.06E-03	rodents
Mammalian omnivores (M422A)	2.60E-01	all mammals
Reptilian insectivores (R222)	5.60E-05	reptile insectivores
Sagebrush lizard	5.60E-05	reptile insectivores
Reptilian carnivores (R322)	6.80E-03	literature value[a]

a. Diller and Johnson 1988

For use in the calculation of screening level values and EBSLs, these values were defaulted to 1.0 if not greater.

There is a great deal of uncertainty associated with using BAFs and PUFs to calculate dose. Very limited values are available in the scientific literature, since they must be both contaminant- and receptor-specific. In the absence of specific BAF or PUF, a value of 1 was assumed. This assumption could over- or underestimate the true dose from the contaminant, and the magnitude of error cannot be quantified. Travis and Arms (1988) and Baes et al. (1984) report BAFs for contaminants to beef and milk, all of these are less than 1 for the contaminants at the INEEL. If the terrestrial receptors of concern accumulate metals and PCBs in a similar way and to a comparable degree as beef and dairy cattle, the use of a BAF of 1 for all contaminants and receptors would overestimate the dose. On the other hand, if the terrestrial receptors of concern at INEEL accumulate metals and PCBs to a much larger degree than beef and dairy cattle, the assumption of BAFs equal to 1 could underestimate the true dose from the COPCs. This same logic is true of PUFs.

K-1.3 Toxicity Reference Values

The exposure modeled using the equations presented previous is then divided by a toxicity reference value (TRV) developed for each COPC/receptor combination to produce an HQ. For EBSL development the TRV provides the value used to calculate acceptable levels below which no adverse effect should be observed. A TRV is defined as a contaminant concentration or dose for a receptor that is likely to be without appreciable risk of adverse effects from chronic exposure. TRV development is a complicated process and is documented in Appendix I.

K-1.4 Summary and EBSLS Presentation

In summary, the EBSLs for radionuclides are presented in Table K-1-6. First the lowest EBSLs calculated for all species and functional groups was selected for both the internal and external dose. From these values the lowest EBSLs from either the internal or external dose was used in the selection of the final EBSL for the radionuclide. The EBSLs for nonradionuclides is presented in Table K-1-7. The lowest EBSLs calculated for all species and functional groups was selected for each nonradionuclide. These EBSLs are applicable to terrestrial sites at the INEEL; but are site specific and should be used with caution at other sites.

Table K-1-6. Overall minimum EBSLs in soil for radionuclide dose.

Radionuclide	External Dose Minimum EBSL	Internal Dose Minimum EBSL	Overall Minimum EBSL
Ag-108m	1.82E+03	4.01E+03	1.82E+03
Am-241	1.32E+05	1.78E+01	1.78E+01
Co-58	3.66E+03	7.17E+03	3.66E+03
Co-60	1.18E+03	2.30E+03	1.18E+03
Cs-137	4.95E+03	5.58E+03	4.95E+03
Eu-152	2.27E+03	2.18E+03	2.18E+03
Eu-154	2.48E+03	3.31E+03	2.48E+03
Pu-238	1.06E+08	1.78E+01	1.78E+01
Pu-239	5.21E+07	1.89E+01	1.89E+01
Ra-226	4.83E+05	2.04E+01	2.04E+01
Sr-90	NA	3.34E+03	3.34E+03
Th-228	1.51E+06	1.81E+01	1.81E+01
Th-230	7.76E+06	2.09E+01	2.09E+01
Th-232	1.81E+07	2.43E+01	2.43E+01
Tl-204	NA	8.21E+03	8.21E+03
Tl-208			
U-234	1.98E+07	2.05E+01	2.05E+01
U-238	8.50E+07	2.32E+01	2.32E+01

Table K-1-7. Minimum EBSL for nonradionuclide contaminants.

Contaminant	Minimum EBSL
1,1,1-Trichloroethane	4.08E+02
2-Butanone	1.91E+01
4-Chloroaniline	5.35E-01
Acetone	2.78E-01
Aluminum	4.27E+00
Antimony	7.47E-01
Aroclor 1254	1.43E-02
Arsenic	8.76E-01
Barium	9.74E-02
Benzene	5.50E+00
Benzo(a)pyrene	3.25E-02
Beryllium	7.34E-01
Cadmium	2.36E-03
Carbon disulfide	5.91E-01
Chromium III	3.25E+00
Chromium VI	1.62E-01
Cobalt	4.54E-01
Copper	2.11E+00
Di-2-ethylhexylphthalate	2.56E+00
Ethylbenzene	2.76E+01
Fluoride	3.11E+00
Lead	7.17E-02
Magnesium	2.30E+00
Manganese	1.41E+01
Mercury	6.13E-03
Methylene chloride	4.27E-01
Nickel	2.69E+00
Nitrate	3.20E+01
Potassium	4.30E+03
Selenium	8.11E-02
Silver	1.35E+00
Sulfate	1.72E+01
Tetrachloroethylene	1.62E+00

Table K-1-7. (continued).

Contaminant	Minimum EBSL
Thallium	1.17E-01
Tin	3.73E+00
Toluene	3.02E+01
Uranium	4.37E-01
Vanadium	2.55E-01
Xylene	2.78E-01
Zinc	6.37E+00

K-2. EXPOSURE MODEL INPUT VALUES

The following guidelines specify the report sections and tables in which (1) ERA exposure equations and (2) input values applied to produce WAG 4 ERA dose calculations and hazard quotients contained in Section K-3 may be found.

K-2.1 Exposure Calculations for Nonradiological Contaminants – Equation 7-8

PP—Table 7-1

PV—Table 7-14

PS—Table 7-14

CS—Appendix B – summarized on Table 7-18

IR—Table 7-14

WI—Table 7-14

ED—Table 7-14

SUF—Site area (Table 7-17) divided by home range (Table 7-14)

CP—Equation 7-9:

CS—Appendix B—summarized on Table 7-18

BAF—Table 7-15

CV—Equation 7-10:

CS—Appendix B—summarized on Table 7-18

PUF—Table 7-15

K-2.2 Hazard Quotient Calculation (HQ)—Equation 7-13

TRVs—Equation 7-12

QCE and AF - Appendix J