



SNIFFER Method - Metals/Metalloids

Project Ref: **A385-00**

Run No: **Tier 1**

1 This worksheet may be used for metal and metalloid contaminants except for lead (Pb).

2 This worksheet has been completed by **Chris Hepworth** on **14/11/2005**

and has been checked by **Sarah MacInnes** on **18/05/2006**

3 It relates to **Antimony** found at **Bishopton**

Toxicology

4 Is the substance a non-threshold substance (Y or N) **N**

5 Insert the Relevant Health Criterion value for ingestion **4.00E-04** mg per kg body weight per day
 For a non-threshold substance the RHC is the Index Dose (ID).
 For threshold substances the RHC is the Tolerable Daily Intake (TDI).

Land Use

6 The Table below lists the default exposure durations and averaging times, used in the method for standard land uses. Please insert Y to indicate your choice of land use and acceptance of the default assumptions.

Land Use	Exposure duration (years)		Averaging time (days)	
	0-6		2190	
Residential with plant uptake	0-6		2190	
Residential without plant uptake	0-6	Y	2190	Y
Allotments	0-6		2190	
Commercial/Industrial	16-59		15695	



Background Exposure

7 Insert Mean Daily Intake (MDI) from non-soil sources
(If the contaminant is a non-threshold substance insert zero)

8.40E-03 mg per day

Is the MDI equal to or greater than 80% of the TDI or is the MDI unknown? (Y or N)

N

8 Because the MDI for children is lower than that for adults, the MDI will need to be corrected by a Childhood Factor (CF) which depends on exposure duration. Insert the appropriate factor here:

Exposure duration (years)	Childhood Factor ingestion
0-6	0.485
16-59	1

0.485

Receptor Body Weight

9 Insert the Time-Averaged (female) Body Weight (TABW) depending on the chosen exposure duration

Exposure duration (years)	TABW
0-6	11.15
16-59	46.4

11.15 kg body weight

Reference Intake

10 For non-threshold substances the Reference Intake (RI) for the ingestion pathway is calculated using the formula: $RI_{ingest}=ID$

mg per kg body weight per day

For threshold substances the Reference Intake (RI) for ingestion pathways is calculated using the formula: $RI_{ingest}=(TDI-((MDI/70 \times 46.4) \times CF)/TABW)^a$

1.57804E-04 mg per kg body weight per day

^a Note - The background component is in line with the approach in CLR 9, namely that the MDI is corrected by the relevant adult body weight.

For threshold substances where the background exposure (MDI) is greater than or equal to 80% of the TDI, or the MDI is unknown, the Reference Intake (RI) for ingestion pathways is calculated using the formula: $RI_{ingest}=0.2TDI$

mg per kg body weight per day

Intake via Soil and Dust Ingestion

11 Select a value for SEI_{dmg} from this table, depending on your choice of land use

Land Use	SEI_{dmg} (kg soil per kg body weight per day)
residential wth plant uptake	9.85319E-06
residential without plant uptake	9.85319E-06
allotment	9.85319E-06
commercial/industrial	5.43222E-07

$SEI_{dmg} = 9.85E-06$ mg per kg body weight per day





12 Is site specific data on the bioaccessibility of the contaminant in soil available? (Y or N)

N

if Y insert the representative fraction here (default=1)

The amended $SEI_{dmg} = SEI_{dmg} \times \text{bioaccessibility fraction}$

9.85319E-06 kg soil per kg body weight per day

13 The nominal assessment sub criterion for intake via soil and dust ingestion using the formula: $ASC_{dmg} = RI_{ingest} / SEI_{dmg}$

ASC = 1.57804E-04
mg per kg body weight per day

/

9.85319E-06
kg soil per kg body weight per day

16.01558105 mg per kg soil

Intake via Consumption of Homegrown Vegetables

14 This pathway only applies to two land uses: residential with plant uptake and allotments. For other land uses go directly to paragraph 24. Select the basis for the Concentration Factor from 15 or 16 below. Select **one** option only.

15 For a number of metal contaminants values of CF are given in CLR10. For the contaminant of concern select the appropriate SEI_{veg} from the Table below.

Contaminant	SEI_{veg} (kg soil/kg body weight/day)
Arsenic	3.88743E-06
Cadmium	3.1033E-04
Chromium	1.11838E-05
Nickel	9.62006E-06
Selenium	5.29089E-05
Mercury	2.15968E-05

^b Note –
For Cadmium the algorithms in CLR10 for calculation of CF are pH sensitive. SEI_{veg} value given is for pH7. See main document Section 7.1.5 for further detail.

$SEI_{veg} =$ kg soil per kg body weight per day

16 Are measured site specific Concentration Factors for leafy and root plant uptake of metals available? (Y or N)

Measured Concentration Factor for leafy vegetables

$CF_{leafy} =$ ug per g (dry or fresh)^c weight plant per ug per g dry weight soil

Measured Concentration Factor for root vegetables

$CF_{root} =$ ug per g (dry or fresh)^c weight plant per ug per g dry weight soil

^c Note - See 17 below

17 For calculation of the SEI_{veg} the units for CF_{leafy} and CF_{root} must be ug per g fresh weight plant over ug per g dry weight soil.

It may be necessary to use a dry weight conversion factor when using measured CF values.

Is a dry weight conversion required? (Y or N)



The Time Averaged Vegetable Consumption Rate for homegrown vegetables used to calculate the SEI_{veg} is given in the Table below.

Vegetable Type	TAVCR (kg FW/day)	TAVCR*HF* CF *DW	TAVCR*HF* CF
Brussel sprouts	5.04750E-03	calc not required	calc not required
Cabbage	4.86885E-03	calc not required	calc not required
Carrot	7.38094E-03	calc not required	calc not required
Leafy salads	3.25677E-03	calc not required	calc not required
Onion	3.69474E-03	calc not required	calc not required
Potato	4.41616E-02	calc not required	calc not required

Select a value for SEI_{veg} from this table for the contaminant of concern, depending on your choice of land use

Land Use	SEI_{veg} (kg soil/kg body weight/day)
residential with plant uptake	calc not required
allotments	calc not required

SEI_{veg} = kg soil per kg body weight per day

18 The nominal assessment sub criterion for intake via consumption of homegrown vegetables is calculated using the formula: $ASC_{veg} = R_{ingest} / SEI_{veg}$

$$\begin{array}{l}
 \text{ASC} = \text{1.57804E-04} \text{ mg per kg body weight per day} \\
 \text{Input } SEI_{veg} \text{ from question 15 or 17} \\
 \text{kg soil per kg body weight per day}
 \end{array}
 /
 =
 \text{\#DIV/0!} \text{ mg per kg soil}$$



Intake via Ingestion of Soil Attached to Vegetables

19 This pathway only applies to two land uses: residential with plant uptake and allotments. For other land uses go directly to paragraph 23.

20 Select a value for SEI_{indirect} from this table, depending on your choice of land use

Land Use	SEI _{indirect} kg soil/kg body weight/day
residential wth plant uptake	1.12723E-06
allotment	1.12723E-06

SEI_{indirect} = kg soil per kg body weight per day

21 Is site specific data on the bioaccessibility of the contaminant in soil available? (Y or N)

Insert the representative fraction here (default=1)

The amended SEI_{indirect} = SEI_{indirect} * bioaccessibility fraction

kg soil per kg body weight per day

22 The nominal assessment sub criterion for intake via indirect soil ingestion using the formula: $ASC_{indirect} = R_{indirect} / SEI_{indirect}$

$$\begin{array}{ccccccc}
 ASC_{indirect} = & \text{1.57804E-04} & / & \text{0} & = & \text{\#DIV/0!} & \text{mg per kg soil} \\
 & \text{mg per kg body} & & \text{kg soil per kg body} & & & \\
 & \text{weight per day} & & \text{weight per day} & & &
 \end{array}$$

Integrated Site Specific Assessment Criterion

		$\Sigma(ASC)$		SSAC	
23 Residential without plant uptake	1/	0.062439196	=	16.015581	mg per kg soil

24 The appropriate SSAC is automatically selected for the landuse scenario chosen

25 The level 1 Site Specific Assessment Criterion for **Antimony** in the **Residential without plant uptake** scenario is **16** mg per kg soil



Risk Evaluation

26 Justify your use of the defaults on the worksheet and characterise the risk associated with the site.
 Include the following:

	Justification provided (Y or N)
i. Choice of Relevant Health Criteria value	Y
ii. Site use (current and intended), comment on compatibility with land use selected	Y
iii. Critical Receptor	Y
iv. Pathways included/omitted (including bioaccessibility if used)	Y
v. Soil Parameters, e.g. pH	Y

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