



Interim ISV Short Guidance

February 13, 2017

Interim Intrusion Screening Values (ISVs) listed in Tables 1 (Residential) and 2 (Commercial/Industrial) below should be used for remediation vapor intrusion investigations instead of the ISVs listed in the 2009 ISV spreadsheet that is on the Minnesota Pollution Control Agency (MPCA) website (Figure 1). 2009 ISVs should only be used when there is no interim ISV listed in this guidance.

MPCA will be releasing interim ISVs for contaminants of potential concern (COPC) at remediation vapor intrusion sites until the ISV spreadsheet can be completely revised. The interim ISVs were developed using new exposure parameters that generally reflect U.S. Environmental Protection Agency's (EPA's) revised exposure parameters (Refer to "ISV equations and exposure parameters" section for details).

- Different types of ISVs used by MPCA are listed below. All of the ISVs were derived based on EPA's Superfund methodology. 2009 ISV
 - Derived in 2009
 - Available in 2009 ISV spreadsheet on MPCA's website
- Interim ISVs
 - Recently derived
 - Uses revised exposure parameters
 - Available in Tables 1 and 2 below
 - In most cases (not all) Interim ISV > 2009 ISV
 - ISV increases due to revised exposure parameters
 - ISV decreases due to new toxicity data
- Expedited ISVs (EISVs)
 - Recently derived
 - Uses increased cancer and noncancer risk
 - Cancer risk = 1E-04 (vs. default for Interim ISV of 1E-05)
 - Noncancer risk = 3 (vs. default for Interim ISV of 1)
- 33X ISV and 33X EISV
 - Recently derived
 - Accounts for EPA's default vapor intrusion attenuation factor of 0.03
 - **33X ISV = ISV / 0.03 (NOT 33 * ISV)**
 - **33X EISV = EISV / 0.03 (NOT 33 * EISV)**
- Calculating a 33X ISV from a 2009 ISV
 - **33X 2009 ISV = 2009 ISV / 0.03 (NOT 2009 ISV * 33)**

When to request the derivation of an Interim ISV for a chemical (Figure 2)

- If any of the site risk driver(s) exceed an interim ISV, a new interim ISV for chemicals currently without an interim ISV is not necessary
- If all of the site risk driver(s) exceed a 2009 ISV (none exceed an Interim ISV), contact the MPCA project team to determine if there is a need for a new Interim ISV

Evaluating risks from trichloroethylene (TCE)

- Shorter than chronic risks may exist at sites where TCE is a risk driver and a woman who is pregnant or could become pregnant is present (Table 1 and 2)
 - TCE ISV and 33X ISV are used to evaluate risk
 - EISV and 33X EISV are **not** used to evaluate risk
 - Please refer to the "Shorter than Chronic Risks from Trichloroethylene" section for additional information

Table 1: Residential Interim ISVs

Chemical	CAS number	Release Date	Residential Indoor Air				Residential Sub-slab Air			
			ISV µg/m ³	Basis	EISV ¹ µg/m ³	Basis	33X ISV ² µg/m ³	Basis	33X EISV ³ µg/m ³	Basis
Benzene	71-43-2	5/25/2016	4.6	Cancer	46	Cancer	150	Cancer	1,500	Cancer
1,3-Butadiene	106-99-0	5/25/2016	0.28	Cancer	2.8	Cancer	9.3	Cancer	93	Cancer
Carbon Tetrachloride	56-23-5	5/25/2016	1.7	Cancer	17	Cancer	57	Cancer	570	Cancer
Chlorobenzene	108-90-7	2/13/2017	52	Noncancer	160	Noncancer	1,700	Noncancer	5,300	Noncancer
1,2-Dibromoethane	106-93-4	2/13/2017	0.017	Cancer	0.17	Cancer	0.57	Cancer	5.7	Cancer
1,2-Dichloroethane	107-06-2	2/13/2017	0.39	Cancer	3.9	Cancer	13	Cancer	130	Cancer
Dichloromethane	75-09-2	5/25/2016	630	Noncancer	1,900	Noncancer	21,000	Noncancer	63,000	Noncancer
Ethylbenzene	100-41-4	5/25/2016	4.1	Cancer	41	Cancer	140	Cancer	1,400	Cancer
2-Hexanone	591-78-6	5/25/2016	31	Noncancer	94	Noncancer	1,000	Noncancer	3,100	Noncancer
Isopropyl Ether	108-20-3	5/25/2016	730	Noncancer	2,200	Noncancer	24,000	Noncancer	73,000	Noncancer
Tetrachloroethylene (PCE)	127-18-4	5/25/2016	3.4	Cancer	34	Cancer	110	Cancer	1,100	Cancer
Toluene	108-88-3	2/13/2017	5,200	Noncancer	16,000	Noncancer	170,000	Noncancer	530,000	Noncancer
Trichloroethylene (TCE) ⁴	79-01-6	5/25/2016	2.1	Noncancer	6.3	Noncancer	70	Noncancer	210	Noncancer
1,2,4-Trimethylbenzene	95-63-6	2/13/2017	63	Noncancer	190	Noncancer	2,100	Noncancer	6,300	Noncancer
1,3,5-Trimethylbenzene	108-67-8	2/13/2017	63	Noncancer	190	Noncancer	2,100	Noncancer	6,300	Noncancer
Vinyl Chloride	75-01-4	5/25/2016	3.2	Cancer	32	Cancer	110	Cancer	1,100	Cancer
Xylene	1330-20-7									
	108-38-3 95-74-6	2/13/2017	100	Noncancer	310	Noncancer	3,300	Noncancer	10,000	Noncancer

ISV – intrusion-screening value

EISV – expedited intrusion screening value

Withdrawn ISVs

Dichlorodifluoromethane (Freon 12) ⁵

cis-1,2-Dichloroethene ⁵

trans-1,2-Dichloroethene ⁵

¹ EISVs are calculated using a noncancer risk (hazard quotient or HQ) of 3 and a cancer risk (excess lifetime cancer risk or ELCR) of 1E-04

² 33X ISVs are calculated by dividing the ISV by the default attenuation factor of 0.03 which is approximately 33X the value of the ISV

³ 33X EISVs are calculated by dividing the EISV by the default attenuation factor of 0.03 which is approximately 33X the value of the EISV

⁴ For TCE, the ISV (2.1 µg/m³) and 33X ISV (70 µg/m³) are used to determine expedited action when a woman who is pregnant or could become pregnant is present. The EISV and 33X EISV are used to determine expedited action for TCE only when a woman who is pregnant or could become pregnant is **not** present.

⁵ If this contaminant is a risk driver at your site, please contact the MPCA project manager to obtain the assistance of a MPCA or Minnesota Department of Health risk assessor.

Table 2: Commercial/Industrial Interim ISVs

Chemical	CAS number	Release date	Commercial/Industrial Indoor Air				Commercial/Industrial Sub-slab Air			
			ISV $\mu\text{g}/\text{m}^3$	Basis	EISV ¹ $\mu\text{g}/\text{m}^3$	Basis	33X ISV ² $\mu\text{g}/\text{m}^3$	Basis	33X EISV ³ $\mu\text{g}/\text{m}^3$	Basis
Benzene	71-43-2	5/25/2016	45	Cancer	320	Noncancer	1,500	Cancer	11,000	Noncancer
1,3-Butadiene	106-99-0	5/25/2016	2.7	Cancer	21	Noncancer	90	Cancer	700	Noncancer
Carbon Tetrachloride	56-23-5	5/25/2016	16	Cancer	160	Cancer	530	Cancer	5,300	Cancer
Chlorobenzene	108-90-7	2/13/2017	180	Noncancer	530	Noncancer	6,000	Noncancer	18,000	Noncancer
1,2-Dibromoethane	106-93-4	2/13/2017	0.16	Cancer	1.6	Cancer	5.3	Cancer	53	Cancer
1,2-Dichloroethane	107-06-2	2/13/2017	3.8	Cancer	38	Cancer	130	Cancer	1,300	Cancer
Dichloromethane	75-09-2	5/25/2016	2100	Noncancer	6,300	Noncancer	70,000	Noncancer	210,000	Noncancer
Ethylbenzene	100-41-4	5/25/2016	39	Cancer	390	Cancer	1,300	Cancer	13,000	Cancer
2-Hexanone	591-78-6	5/25/2016	110	Noncancer	320	Noncancer	3,700	Noncancer	11,000	Noncancer
Isopropyl Ether	108-20-3	5/25/2016	2500	Noncancer	7,400	Noncancer	83,000	Noncancer	250,000	Noncancer
Tetrachloroethylene (PCE)	127-18-4	5/25/2016	33	Cancer	160	Noncancer	1,100	Cancer	5,300	Noncancer
Toluene	108-88-3	2/13/2017	18,000	Noncancer	53,000	Noncancer	600,000	Noncancer	1,800,000	Noncancer
Trichloroethylene (TCE) ⁴	79-01-6	5/25/2016	7.0	Noncancer	21	Noncancer	230	Noncancer	700	Noncancer
1,2,4-Trimethylbenzene	95-63-6	2/13/2017	210	Noncancer	630	Noncancer	7,000	Noncancer	21,000	Noncancer
1,3,5-Trimethylbenzene	95-63-6	2/13/2017	210	Noncancer	630	Noncancer	7,000	Noncancer	21,000	Noncancer
Vinyl Chloride	75-01-4	5/25/2016	22	Cancer	220	Cancer	730	Cancer	7,300	Cancer
Xylene	1330-20-7									
	108-38-3									
	95-47-6	2/13/2017	350	Noncancer	1,100	Noncancer	12,000	Noncancer	37,000	Noncancer

ISV – intrusion-screening value

EISV – expedited intrusion screening value

Withdrawn ISVs

Dichlorodifluoromethane (Freon 12) ⁵

cis-1,2-Dichloroethene ⁵

trans-1,2-Dichloroethene ⁵

¹ EISVs are calculated using a noncancer risk (hazard quotient or HQ) of 3 and a cancer risk (excess lifetime cancer risk or ELCR) of 1E-04

² 33X ISVs are calculated by dividing the ISV by the default attenuation factor of 0.03 which is approximately 33X the value of the ISV

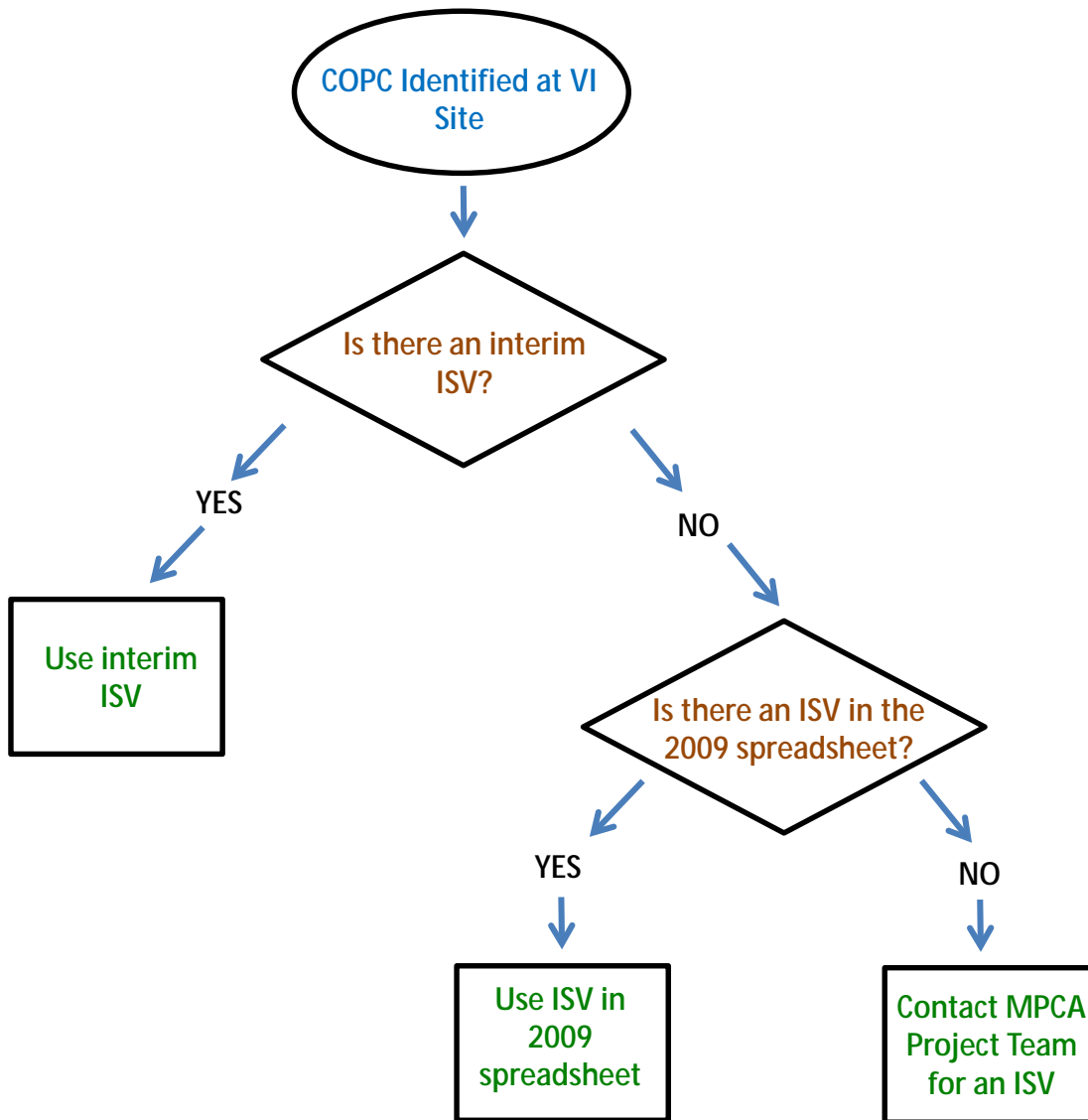
³ 33X EISVs are calculated by dividing the EISV by the default attenuation factor of 0.03 which is approximately 33X the value of the EISV

⁴ For TCE, the ISV ($7.0 \mu\text{g}/\text{m}^3$) and 33X ISV ($230 \mu\text{g}/\text{m}^3$) are used to determine expedited action when a woman who is pregnant or could become pregnant is present. The EISV and 33X EISV are used to determine expedited action for TCE only when a woman who is pregnant or could become pregnant is **not** present.

⁵ If this contaminant is a risk driver at your site, please contact the MPCA project manager to obtain the assistance of a MPCA or Minnesota Department of Health risk assessor.

Figure 1: Using the correct ISVs

What Intrusion Screening Values (ISVs) To Use



When to Request a New Interim Intrusion Screening Value (ISV)

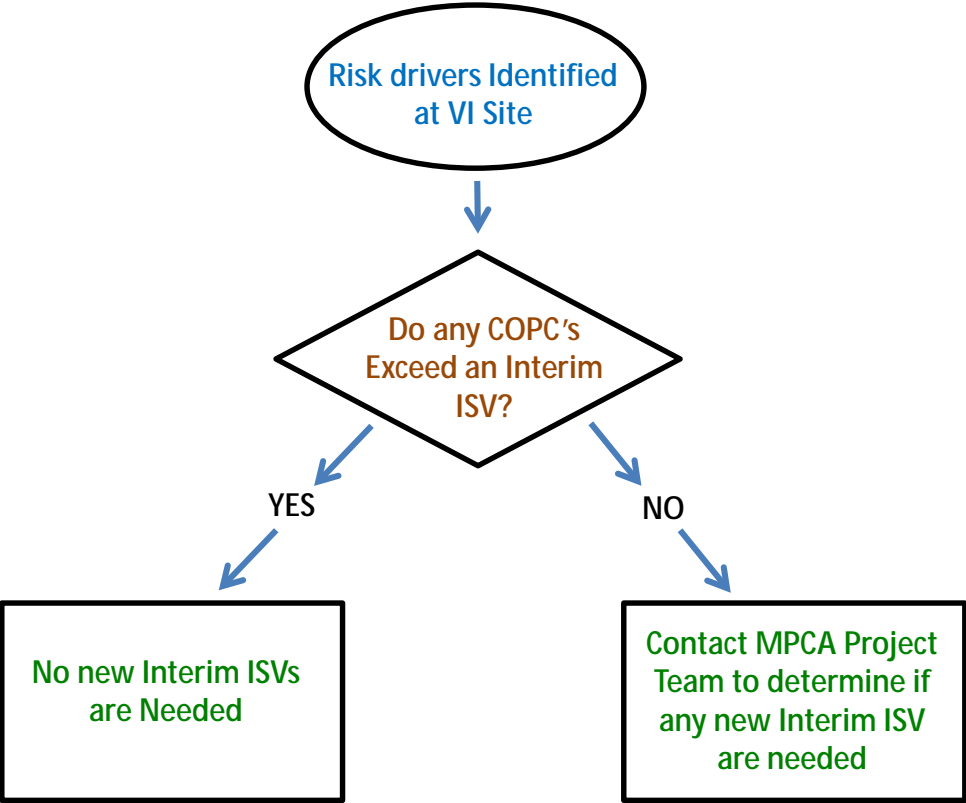


Figure 2: When to Request a new Interim ISV

ISV equations and exposure parameters

Interim ISVs are derived based on EPA Superfund methodology. MPCA uses all of EPA's recommended default exposure parameters except exposure time for the commercial/industrial land use category. EPA recommends an exposure time for a worker of eight hours per day. MPCA uses ten hours per day since most full time workers are expected to spend more than eight hours per day at their workplace.

Residential ISVs in $\mu\text{g}/\text{m}^3$

Residential cancer ISV without age dependent adjustment factors (ADAFs)

$$ISV = \frac{CR * AT}{EF * ED * ET * CF * IUR}$$

Exposure parameter	Value	Units
CR-Cancer risk	1.0E-05	none
AT-Averaging time	25550	days
EF-Exposure frequency	350	days/year
ED-Exposure duration (0-26 years)	26	years
EDi-Exposure duration (0-2 years)	2	years
EDc-Exposure duration (2-16 years)	14	years
EDa-Exposure duration (16-26 years)	10	years
ET-Exposure time	24	hours/day
CF-Conversion factor	1/24	day/hours
IUR-Inhalation unit risk	Chemical specific	$\mu\text{g}/\text{m}^3$

Residential cancer ISV with ADAFs

$$ISV = \frac{CR * AT}{IUR * CF * [(EF * EDi * ET * ADAFi) + (EF * EDc * ET * ADAFc) + (EF * EDa * ET * ADAFa)]}$$

Exposure parameter	Value	Units
ADAFi-Age dependent adjustment factors (infant)	10	none
ADAFc-Age dependent adjustment factors (child)	3	none
ADAFa-Age dependent adjustment factors (adult)	1	none

If chemical specific adjustment factors have been determined, they are used instead of default ADAFs.

Expedited ISVs (EISVs)

EISVs are derived using a CR (cancer risk) of 1E-04.

Residential noncancer chronic ISV

$$ISV = \frac{HQ * AT * RfC}{EF * ED * ET * CF}$$

Exposure parameter	Value	Units
HQ-Hazard quotient	1	none
AT-Averaging time	9490	days
RfC-Reference concentration	Chemical specific	µg/m ³
EF-Exposure frequency	350	days/year
ED-Exposure duration	26	years
ET-Exposure time	24	hours/day
CF-Conversion factor	1/24	day/hours

Expedited ISVs (EISVs)

EISVs are derived using a HQ (hazard quotient) of 3.

Commercial/Industrial ISVs in µg/m³

Commercial/Industrial cancer ISV

$$ISV = \frac{CR * AT}{EF * ED * ET * CF * IUR}$$

Exposure parameter	Value	Units
CR-Cancer risk	1.0E-05	none
AT-Averaging time	25550	days
EF-Exposure frequency	250	days/year
ED-Exposure duration	25	years
ET-Exposure time	10	hours/day
CF-Conversion factor	1/24	day/hours
IUR-Inhalation unit risk	Chemical specific	µg/m ³

Expedited ISVs (EISVs)

EISVs are derived using a CR (cancer risk) of 1E-04.

Commercial/Industrial noncancer chronic ISV

$$ISV = \frac{HQ * AT * RfC}{EF * ED * ET * CF}$$

Exposure parameter	Value	Units
HQ-Hazard quotient	1	none
AT-Averaging time	9125	days
RfC-Reference concentration	Chemical specific	$\mu\text{g}/\text{m}^3$
EF-Exposure frequency	250	days/year
ED-Exposure duration	25	years
ET-Exposure time	10	hours/day
CF-Conversion factor	1/24	day/hours

Expedited ISVs (EISVs)

EISVs are derived using a HQ (hazard quotient) of 3.

Shorter than Chronic Risks from Trichloroethylene

Available data suggests that shorter than chronic exposure (acute and short-term) to trichloroethylene (TCE) from vapor intrusion may result in cardiac malformations to the developing fetus. EPA recommends expedited action at vapor intrusion sites when TCE is present and a women of child bearing age is an occupant of the building (EPA 2014). As a result, MPCA evaluates the need for expedited action based on exceedance of the ISV for indoor air samples and 33X ISV for sub-slab air samples at sites where TCE is a contaminant and a woman who is pregnant or could become pregnant is an occupant of the building.

EPA 2014. Environmental Protection Agency. Hiatt, G. and Stralka D. June 30, 2014. EPA Region 9 Interim Action Levels and Response Recommendations to Address Potential Developmental Hazards Arising from Inhalation Exposures to TCE in Indoor Air from Subsurface Vapor Intrusion.

ISV rounding procedure

Interim ISVs are rounded to two significant figures as shown in the examples shown below. This procedure is not intended to indicate that this level of accuracy exists in the ISV calculation. Most often toxicity values consist of only one significant digit. In some cases, a toxicity value may consist of two significant digits. If the ISVs were reported as one digit in all cases, it would result in significant increases and decreases from the actual calculated value to the rounded value. This procedure is intended to keep those increase and decreases to a minimum.

- ISV is less than 1
 - Report to 2 digits
 - Examples
 - § 0.712 rounded to 0.71 $\mu\text{g}/\text{m}^3$
 - § 0.0235 rounded to 0.024 $\mu\text{g}/\text{m}^3$
- ISV is equal to or greater than 1 but less than 10
 - Report to 2 digits
 - Examples
 - § 1.27 rounded to 1.3 $\mu\text{g}/\text{m}^3$
 - § 3.51 rounded to 3.5 $\mu\text{g}/\text{m}^3$
- ISV is equal to or greater than 10 but less than 100
 - Report to 2 digits
 - Examples
 - § 23.2 rounded to 23 $\mu\text{g}/\text{m}^3$
 - § 16.5 rounded to 17 $\mu\text{g}/\text{m}^3$
- ISV is equal to or greater than 100 but less than 1,000
 - Report to 2 digits
 - Examples
 - § 134.1 rounded to 130 $\mu\text{g}/\text{m}^3$
 - § 198 rounded to 200 $\mu\text{g}/\text{m}^3$
- ISV is equal to or greater than 1,000 but less than 10,000
 - Report to 2 digits
 - Examples
 - § 2,323 rounded to 2,300 $\mu\text{g}/\text{m}^3$
 - § 6,555 rounded to 6,600 $\mu\text{g}/\text{m}^3$
- ISV is equal to or greater than 10,000 but less than 100,000
 - Report to 2 digits
 - Examples
 - § 12,346 rounded to 12,000 $\mu\text{g}/\text{m}^3$
 - § 12,667 rounded to 13,000 $\mu\text{g}/\text{m}^3$