Office of the Revisor of Statutes
Administrative Rules

TITLE: Adopted Permanent Rules Relating to Health Risk Limits for Groundwater Standards

AGENCY: Department of Health

REVISOR ID: R-4587

MINNESOTA RULES: Chapter 4717

The attached rules are approved for filing with the Secretary of State

Document Number: 238856
Filed on October 13, 2023
Office of the Minnesota
Secretary of State, Steve Simon

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Adopted Permanent Rules Relating to Health Risk Limits for Groundwater Standards

4717.7860 HEALTH RISK LIMITS TABLE.

[For text of subparts 1 to 3b, see Minnesota Rules]

Subp. 3c. **Acetone.**

CAS number: 67-64-1

Year Adopted: 2023

Volatility: Moderate

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	5,000	5,000 (2)	3,000	NA
RfD (mg/kg-day)	--	3.1	(2)	0.69	--
RSC	--	0.5	(2)	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	0.045	--
Endpoints	--	renal (kidney) system	renal (kidney) system	hematological (blood) system, hepatic (liver) system, renal (kidney) system	--

[For text of subparts 3d to 4, see Minnesota Rules]

Subp. 4a. **Aminomethylphosphonic acid (AMPA).**

CAS number: 1066-51-9

Year Adopted: 2023

Volatility: Nonvolatile

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	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	ND	3,000	1,000	--
RfD (mg/kg-day)	--	--	0.96	0.32	--
RSC	--	--	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	--	0.074	0.045	--
Endpoints	--	--	hepatic (liver) system, renal (kidney) system	hepatic (liver) system, renal (kidney) system	--

[For text of subparts 5 to 6b, see Minnesota Rules]

Subp. 6c. **Benzo[a]pyrene.**

CAS number: 50-32-8

Year Adopted: 2023

Volatility: Low

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	0.5	0.5 (2)	0.5 (2)	0.1
RfD (mg/kg-day)	--	0.00031	(2)	(2)	--
RSC	--	0.5	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	1
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)

Intake Rate (L/kg-day)	--	0.290	(2)	(2)	0.155 (<2) 0.040 (2 to <16) 0.042 (16+)
Endpoints	--	developmental, nervous system	developmental, nervous system	developmental, nervous system	cancer

Subp. 6d. **Benzophenone.**

CAS number: 119-61-9

Year Adopted: 2023

Volatility: Low

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	ND	900	100	100 (3)	NA
RfD (mg/kg-day)	--	0.52	0.053	(3)	--
RSC	--	0.5	0.2	(3)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	0.074	(3)	--
Endpoints	--	developmental	hepatic (liver) system, renal (kidney) system	hepatic (liver) system, renal (kidney) system	--

Subp. 6e. **1H-Benzotriazole.**

CAS number: 95-14-7

Year Adopted: 2023

Volatility: Low

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	20	20 (2)	20 (2)	NA
RfD (mg/kg-day)	--	0.023	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	developmental	developmental	developmental	--

Subp. 6f. **Biphenyl.**

CAS number: 92-52-4

Year Adopted: 2023

Volatility: Moderate

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	400	100	100 (2)	100 (2)	10
RfD (mg/kg-day)	0.58	0.18	(2)	(2)	--
RSC	0.2	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	0.008
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	0.290	0.290	(2)	(2)	0.155 $_{(<2)}$ 0.040 $_{(2\ to\ <16)}$

					0.042 (16+)
Endpoints	renal (kidney) system	renal (kidney) system	renal (kidney) system	renal (kidney) system	cancer

Subp. 6g. **Bisphenol A (BPA).**

CAS number: 80-05-7

Year Adopted: 2015

Volatility: Nonvolatile

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	ND	100	20	20 (3)	NA
RfD (mg/kg-day)	--	0.16	0.0065	(3)	--
RSC	--	0.2	0.2	(3)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.289	0.077	(3)	--
Endpoints	--	developmental, female reproductive system (E), hepatic (liver) system, male reproductive system (E), renal (kidney) system, thyroid (E)	hepatic (liver) system, renal (kidney) system	hepatic (liver) system, renal (kidney) system	--

Subp. 6h. **Bromodichloromethane.**

CAS number: 75-27-4

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	400	30	30 (2)	30	3
RfD (mg/kg-day)	0.073	0.039	(2)	0.0075	--
RSC	0.2	0.2	(2)	0.2	--
SF (per mg/kg-day)	--	--	--	--	0.035
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	0.038	0.290	(2)	0.045	0.155 $_{(<2)}$ 0.040 $_{(2\ to\ <16)}$ 0.042 $_{(16+)}$
Endpoints	female reproductive system (E)	immune system, spleen	immune system, spleen	hepatic (liver) system	cancer

Subp. 6i. **Butyl benzyl phthalate.**

CAS number: 85-68-7

Year Adopted: 2015

Volatility: Low

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	100	100	100 (2)	100 (2)	NA

RfD (mg/kg-day)	0.15	0.15	(2)	(2)	--
RSC	0.2	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	0.289	0.289	(2)	(2)	--
Endpoints	developmental (E)	developmental (E)	developmental (E)	developmental (E)	--

Subp. 6j. **Cadmium.**

CAS number: 7440-43-9

Year Adopted: 2015

Volatility: Nonvolatile

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	5	1	1	0.5	NA
RfD (mg/kg-day)	0.0077	0.0016	0.00044	0.00011	--
RSC	0.2	0.2	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	0.289	0.289	0.077	0.043	--
Endpoints	developmental	developmental, nervous system, renal (kidney) system	developmental, skeletal	renal (kidney) system, skeletal	--

Subp. 6k. **Carbamazepine.**

CAS number: 298-46-4

Year Adopted: 2013

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	40	40	40 (2)	40 (2)	NA
RfD (mg/kg-day)	0.013	0.013	(2)	(2)	--
RSC	0.8	0.8	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	0.289	0.289	(2)	(2)	--
Endpoints	develop-mental, nervous system	develop-mental, hematological (blood) system, hepatic (liver) system, immune system, nervous system, male reproductive system (E), female reproductive system (E), thyroid (E)	develop-mental, hematological (blood) system, hepatic (liver) system, immune system, nervous system, male reproductive system (E), female reproductive system (E), thyroid (E)	develop-mental, hematological (blood) system, hepatic (liver) system, immune system, nervous system, male reproductive system (E), female reproductive system (E), thyroid (E)	--

Subp. 6l. **Carbon tetrachloride.**

CAS number: 56-23-5

Year Adopted: 2013

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	100	3	3 (2)	3 (2)	1
RfD (mg/kg-day)	0.18	0.0037	(2)	(2)	--
RSC	0.2	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	0.07
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	0.289	0.289	(2)	(2)	0.137 $_{(<2)}$ 0.047 $_{(2\ to\ <16)}$ 0.039 $_{(16+)}$
Endpoints	develop-mental, hepatic (liver) system	hepatic (liver) system	hepatic (liver) system	hepatic (liver) system	cancer

[For text of subparts 7 to 8e, see Minnesota Rules]

Subp. 8f. **1, 4-Dichlorobenzene.**

CAS number: 106-46-7

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	50	50 (2)	50 (2)	NA
RfD (mg/kg-day)	--	0.069	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	developmental, hepatic (liver) system, nervous system	developmental, hepatic (liver) system, nervous system	developmental, hepatic (liver) system, nervous system	--

Subp. 8g. **Dichlorodifluoromethane.**

CAS number: 75-71-8

Year Adopted: 2011

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	ND	ND	700	NA
RfD (mg/kg-day)	--	--	--	0.15	--
RSC	--	--	--	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	--	--	0.043	--
Endpoints	--	--	--	None	--

Subp. 8h. **1,2-Dichloroethane.**

CAS number: 107-06-2

Year Adopted: 2013

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	200	200 (2)	60	1
RfD (mg/kg-day)	--	0.23	(2)	0.012	--
RSC	--	0.2	(2)	0.2	--
SF (per mg/kg-day)	--	--	--	--	0.091
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	--	0.289	(2)	0.043	0.137 $_{(<2)}$ 0.047 $_{(2\ to\ <16)}$ 0.039 $_{(16+)}$
Endpoints	--	hepatic (liver) system	hepatic (liver) system	renal (kidney) system, hepatic (liver) system	cancer

Subp. 8i. **trans-1,2-Dichloroethene.**

CAS number: 156-60-5

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	ND	50	9	NA

RfD (mg/kg-day)	--	--	0.020	0.0020	--
RSC	--	--	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	--	0.074	0.045	--
Endpoints	--	--	immune system	immune system	--

Subp. 8j. **1,1-Dichloroethylene (Vinylidene chloride).**

CAS number: 75-35-4

Year Adopted: 2023

Volatility: High

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	ND	ND	200	200	NA
RfD (mg/kg-day)	--	--	0.069	0.040	--
RSC	--	--	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	--	0.074	0.045	--
Endpoints	--	--	hepatic (liver) system	hepatic (liver) system	--

Subp. 8k. **1, 2-Dichloropropane.**

CAS number: 78-87-5

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	20	20 (2)	20 (2)	3
RfD (mg/kg-day)	--	0.029	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	0.037
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	$0.155_{(<2)}$ $0.040_{(2\ to\ <16)}$ $0.042_{(16+)}$
Endpoints	--	developmental	developmental	developmental	cancer

[For text of subparts 9 to 12, see Minnesota Rules]

Subp. 12a. **17α-Ethinylestradiol.**

CAS number: 57-63-6

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	0.0005	0.0002	0.0002	NA

RfD (mg/kg-day)	--	1.7×10^{-7}	1.4×10^{-8}	1.4×10^{-8}	--
RSC	--	0.8	0.8	0.8	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	0.074	0.045	--
Endpoints	--	developmental (E), female reproductive system (E), male reproductive system (E)	developmental	developmental	--

Subp. 12b. **Ethylbenzene.**

CAS number: 100-41-4

Year Adopted: 2023

Volatility: High

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	ND	40	40 (2)	40 (2)	NA
RfD (mg/kg-day)	--	0.06	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--

Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	hepatic (liver) system, renal (kidney) system	hepatic (liver) system, renal (kidney) system	hepatic (liver) system, renal (kidney) system	--

Subp. 12c. ***S*-Ethyl-*N*,*N*-dipropylthiocarbamate (EPTC).**

CAS number: 759-94-4

Year Adopted: 2018

Volatility: Moderate

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	300	300	90	40	NA
RfD (mg/kg-day)	0.16	0.16	0.033	0.0083	--
RSC	0.5	0.5	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	0.285	0.285	0.070	0.044	--
Endpoints	nervous system	developmental, female reproductive system, nervous system	cardiovascular system	cardiovascular system	--

Subp. 12d. **Ethylene glycol.**

CAS number: 107-21-1

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	2,000	2,000	2,000	NA
RfD (mg/kg-day)	--	0.33	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.038	(2)	(2)	--
Endpoints	--	developmental	developmental, renal (kidney) system	developmental, male reproductive system, renal (kidney) system	--

Subp. 12e. **Fluoranthene.**

CAS number: 206-44-0

Year Adopted: 2018

Volatility: Low

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	ND	200	70	NA
RfD (mg/kg-day)	--	--	0.053	0.016	--
RSC	--	--	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--

Intake Rate (L/kg-day)	--	--	0.070	0.044	--
Endpoints	--	--	hepatic (liver) system, renal (kidney) system	hepatic (liver) system, renal (kidney) system	--

Subp. 12f. **Fluorene (9H-Fluorene).**

CAS number: 86-73-7

Year Adopted: 2023

Volatility: Moderate

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	ND	200	80	NA
RfD (mg/kg-day)	--	--	0.058	0.018	--
RSC	--	--	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	--	0.074	0.045	--
Endpoints	--	--	hematological (blood) system, spleen	hematological (blood) system, spleen	--

Subp. 12g. **Fomesafen.**

CAS number: 72178-02-0

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	200	200 (2)	20	NA

RfD (mg/kg-day)	--	0.12	(2)	0.005	--
RSC	--	0.5	(2)	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	0.045	--
Endpoints	--	developmental, hepatic (liver) system, immune system	developmental, hepatic (liver) system, immune system	hepatic (liver) system	--

Subp. 12h. **Imidacloprid.**

CAS number: 138261-41-3

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	100	2	2 (2)	2 (2)	NA
RfD (mg/kg-day)	0.15	0.0036	(2)	(2)	--
RSC	0.2	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	0.290	0.290	(2)	(2)	--
Endpoints	nervous system	immune system	immune system	immune system	--

Subp. 12i. **Manganese.**

CAS number: 7439-96-5

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	100	ND	ND	NA
RfD (mg/kg-day)	--	0.083	--	--	--
RSC	--	0.5	--	--	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	--	--	--
Endpoints	--	developmental, nervous system	--	--	--

Subp. 12j. **Metolachlor and S-Metolachlor.**

CAS number: 51218-45-2; 87392-12-9

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	300	300 (2)	300 (2)	NA
RfD (mg/kg-day)	--	0.19	(2)	(2)	--
RSC	--	0.5	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--

ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	developmental	developmental	developmental	--

Subp. 12k. **Metolachlor ESA.**

CAS number: 171118-09-5

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	ND	7,000	1,000	NA
RfD (mg/kg-day)	--	--	2.7	0.27	--
RSC	--	--	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	--	0.074	0.045	--
Endpoints	--	--	hepatic (liver) system	hepatic (liver) system	--

Subp. 12l. **Metolachlor OXA.**

CAS number: 152019-73-3

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	5,000	5,000 (2)	1,000	NA

RfD (mg/kg-day)	--	2.7	(2)	0.27	--
RSC	--	0.5	(2)	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	0.045	--
Endpoints	--	none	none	none	--

Subp. 12m. **Metribuzin.**

CAS number: 21087-64-9

Year Adopted: 2013

Volatility: Low

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	30	10	10 (2)	10 (2)	NA
RfD (mg/kg-day)	0.016	0.006	(2)	(2)	--
RSC	0.5	0.5	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	0.289	0.289	(2)	(2)	--
Endpoints	developmental, nervous system	thyroid (E)	thyroid (E)	thyroid (E)	--

Subp. 12n. **Naphthalene.**

CAS number: 91-20-3

Year Adopted: 2013

Volatility: Moderate

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	70	70	70 (2)	70	NA
RfD (mg/kg-day)	0.038	0.038	(2)	0.016	--
RSC	0.5	0.5	(2)	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	0.289	0.289	(2)	0.043	--
Endpoints	nervous system	nervous system	nervous system	nervous system, spleen	--

[For text of subpart 13, see Minnesota Rules]

Subp. 13a. **p-Nonylphenol (4-Nonylphenol).**

CAS number: 84852-15-3

Year Adopted: 2023

Volatility: Low

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	100	40	20	NA
RfD (mg/kg-day)	--	0.21	0.016	0.0049	--
RSC	--	0.2	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	--

ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	0.074	0.045	--
Endpoints	--	developmental, female reproductive system	renal (kidney) system	renal (kidney) system	--

Subp. 13b. **4-*tert*-Octylphenol.**

CAS number: 140-66-9

Year Adopted: 2023

Volatility: Low

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	100	100 (2)	100 (2)	NA
RfD (mg/kg-day)	--	0.17	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	developmental	developmental	developmental	--

[For text of subpart 14, see Minnesota Rules]

Subp. 14a. **Perfluorobutane sulfonate (PFBS).**

CAS number: 45187-15-3; 375-73-5; 29420-49-3; 68259-10-9; 60453-92-1

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	0.1	0.1 (2)	0.1 (2)	NA
RfD (mg/kg-day)	--	0.000084	(2)	(2)	--
RSC	--	0.5	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	thyroid (E)	thyroid (E)	thyroid (E)	--

[For text of subpart 14b, see Minnesota Rules]

Subp. 14c. **Perfluorohexane sulfonate (PFHxS) and salts.**

CAS number: 108427-53-8; 355-46-4; 3871-99-6

Year Adopted: 2023

Volatility: Moderate

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	NA	0.047	0.047	0.047	NA
RfD (mg/kg-day)	--	0.0000097	0.0000097	0.0000097	--
RSC	--	0.5	--	--	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--

Intake Rate (L/kg-day)	--	*	*	*	--
Endpoints	--	hepatic (liver) system, thyroid (E)	hepatic (liver) system, thyroid (E)	hepatic (liver) system, thyroid (E)	--

* 95th percentile water intake rates (Tables 3-1, 3-3, and 3-5 Environmental Protection Agency, Exposure Factors Handbook, 2019) or upper percentile breast milk intake rates (Table 15-1, Environmental Protection Agency, Exposure Factors Handbook, 2011), and MDH background information.

Subp. 14d. **Perfluorohexanoate (PFHxA) and salts.**

CAS number: 92912-52-7; 307-24-4; 21615-47-4; 2923-26-4

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	ND	0.2	0.2 (2)	0.2 (2)	NA
RfD (mg/kg-day)	--	0.00032	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	developmental, thyroid (E)	developmental, thyroid (E)	developmental, thyroid (E)	--

[For text of subparts 15 to 16a, see Minnesota Rules]

Subp. 16b. **Quinoline.**

CAS number: 91-22-5

Year Adopted: 2023

Volatility: Low

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	ND	ND	4	0.03
RfD (mg/kg-day)	--	--	--	0.00079	--
RSC	--	--	--	0.2	--
SF (per mg/kg-day)	--	--	--	--	3
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	--	--	--	0.045	0.155 $_{(<2)}$ 0.040 $_{(2\ to\ <16)}$ 0.042 $_{(16+)}$
Endpoints	--	--	--	hematological (blood) system, hepatic (liver) system, renal (kidney) system, respiratory system, and spleen	cancer

[For text of subparts 17 and 17a, see Minnesota Rules]

Subp. 18. **Tetrachloroethylene (PCE or PERC).**

CAS number: 127-18-4

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	ND	7	7 (3)	4
RfD (mg/kg-day)	--	--	0.0026	(3)	--
RSC	--	--	0.2	(3)	--
SF (per mg/kg-day)	--	--	--	--	0.0249
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	--	--	0.074	(3)	$0.155_{(<2)}$ $0.040_{(2\ to\ <16)}$ 0.042 (16+)
Endpoints	--	--	nervous system	nervous system	cancer

[For text of subparts 18a and 18b, see Minnesota Rules]

Subp. 18c. **Toluene.**

CAS number: 108-88-3

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	70	70 (2)	70 (2)	NA
RfD (mg/kg-day)	--	0.10	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	immune system, nervous system	immune system, nervous system	immune system, nervous system	--

[For text of subparts 18d to 21a, see Minnesota Rules]

Subp. 21b. **1,2,3-Trimethylbenzene.**

CAS number: 526-73-8

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	30	30 (2)	30 (2)	NA
RfD (mg/kg-day)	--	0.042	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	nervous system	nervous system	nervous system	--

Subp. 21c. **1,2,4-Trimethylbenzene.**

CAS number: 95-63-6

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	30	30 (2)	30 (2)	NA
RfD (mg/kg-day)	--	0.042	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	nervous system	nervous system	nervous system	--

Subp. 22. **1,3,5-Trimethylbenzene.**

CAS number: 108-67-8

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	30	30 (2)	30 (2)	NA
RfD (mg/kg-day)	--	0.042	(2)	(2)	--
RSC	--	0.2	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--

Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	nervous system	nervous system	nervous system	--

Subp. 22a. **Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)**

CAS number: 13674-87-8

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	ND	ND	20	8	0.8
RfD (mg/kg-day)	--	--	0.0067	0.0019	--
RSC	--	--	0.2	0.2	--
SF (per mg/kg-day)	--	--	--	--	0.13
ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	--	--	0.074	0.045	$0.155_{(<2)}$ $0.040_{(2\ to\ <16)}$ 0.042 (16+)
Endpoints	--	--	hepatic (liver) system; kidney system	male reproductive system; renal (kidney) system	cancer

Subp. 22b. **Tris(2-butoxyethyl) phosphate (TBEP)**

CAS number: 78-51-3

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	30	30 (2)	30	NA
RfD (mg/kg-day)	--	0.043	(2)	0.0074	--
RSC	--	0.2	(2)	0.2	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	0.045	--
Endpoints	--	hepatic (liver) system	hepatic (liver) system	hepatic (liver) system	--

Subp. 22c. **Tris(2-chloroethyl) phosphate.**

CAS number: 115-96-8

Year Adopted: 2013

Volatility: Low

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	ND	300	200	200 (3)	5
RfD (mg/kg-day)	--	0.15	0.068	(3)	--
RSC	--	0.5	0.2	(3)	--
SF (per mg/kg-day)	--	--	--	--	0.02

ADAF or $AF_{lifetime}$	--	--	--	--	10 ($ADAF_{<2}$) 3 ($ADAF_{2\ to\ <16}$) 1 ($ADAF_{16+}$)
Intake Rate (L/kg-day)	--	0.289	0.077	(3)	0.137 $_{(<2)}$ 0.047 $_{(2\ to\ <16)}$ 0.039 $_{(16+)}$
Endpoints	--	renal (kidney) system, nervous system, develop-mental	renal (kidney) system	renal (kidney) system	cancer

Subp. 22d. **Venlafaxine.**

CAS number: 93413-69-5 (free base), 93300-78-4 (HCl salt)

Year Adopted: 2023

Volatility: Nonvolatile

	Acute	**Short-term**	**Subchronic**	**Chronic**	**Cancer**
HRL (µg/L)	ND	10	10 (2)	10 (2)	NA
RfD (mg/kg-day)	--	0.0054	(2)	(2)	--
RSC	--	0.8	(2)	(2)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	--	0.290	(2)	(2)	--
Endpoints	--	developmental, gastrointestinal system, male reproductive	developmental, gastrointestinal system, male reproductive	developmental, gastrointestinal system, male reproductive	--

		system, nervous system (E)	system, nervous system (E)	system, nervous system (E)	

[For text of subpart 23, see Minnesota Rules]

Subp. 23a. **Xylenes.**

CAS number: 1330-20-7

Year Adopted: 2023

Volatility: High

	Acute	Short-term	Subchronic	Chronic	Cancer
HRL (µg/L)	700	300	300	300 (3)	NA
RfD (mg/kg-day)	1.0	0.38	0.12	(3)	--
RSC	0.2	0.2	0.2	(3)	--
SF (per mg/kg-day)	--	--	--	--	--
ADAF or $AF_{lifetime}$	--	--	--	--	--
Intake Rate (L/kg-day)	0.290	0.290	0.074	(3)	--
Endpoints	nervous system	developmental, nervous system	developmental, renal (kidney) system, nervous system	developmental, renal (kidney) system, nervous system	--

[For text of subpart 24, see Minnesota Rules]

REPEALER. Minnesota Rules, parts 4717.7500, subparts 11, 15, 34a, 45a, 54, 58a, and 61; and 4717.7850, subpart 2, item E, are repealed.

Document Number: 238856
Filed on October 13, 2023
Office of the Minnesota
Secretary of State, Steve Simon