567—137.5(455H) Statewide standards.

137.5(1) *Purpose.* This rule defines the basis and procedure for establishing statewide standards for contaminants in groundwater, soil, and surface water. Statewide standards for groundwater and soil represent concentrations of contaminants in these media at which normal exposure via ingestion and dermal contact with soil is considered unlikely to pose a threat to human health. Statewide standards for surface water are based on protection of aquatic life and protection of human health. This rule also describes how air standards are to be addressed.

137.5(2) *Scope.* Statewide standards described herein address what are considered to be the most likely, normal exposure situations. Statewide standards for groundwater address direct exposure via ingestion to individual contaminants in the media of concern only. Statewide standards for soil address direct exposure to individual contaminants via ingestion and dermal contact. In the event exposure to multiple contaminants may occur or exposure from more than one medium may occur, statewide standards alone may not be protective of human health; therefore, cumulative risk standards must be met in accordance with subrule 137.10(7). In addition, the department may deny the use of the statewide standards prescribed herein and require the use of site-specific standards based on site-specific conditions pursuant to subrule 137.6(10).

Examples of exposure concerns not anticipated by the statewide standards might include, but are not limited to:

- Significant plant uptake of contaminants from soil or groundwater;
- Contaminants entering drinking water lines from contact with soil or groundwater;
- Ecological concerns, other than for surface water;
- Groundwater in a nonprotected groundwater source that is used or likely to be used for drinking water or other use.

137.5(3) *Establishment of risk-based contaminant concentrations.*

a. Risk-based concentration formula. Risk-based contaminant concentrations for soil and groundwater, except lead, shall be computed using the following formula, where appropriate:

(Formula I)

$$C = \left| \frac{RF \times AT \times 365 \text{ days/year}}{Abs \times [(ER_c \times EF_c \times ED_c) \div BW_c + (ER_a \times EF_a \times ED_a) \div BW_a] \times CF} \right|$$

NOTE: When a risk-based concentration is computed for two routes of exposure to the same medium (e.g., soil oral exposure and soil dermal exposure), the composite risk-based concentration equals the multiple of the risk-based concentration for each route of exposure divided by the sum of the risk-based concentration for each route of exposure.

Where: C = Concentration of contaminant (soil: mg/kg, water: mg/l)
RF = Risk factor

For protection from cancer health risks:
$RF = TR \div SF$
Where: TR = Target cancer risk (unitless)
SF = Slope factor $[(mg/kg)/day]^{-1}$ for a route of exposure; see paragraph *"c"* for source.

For protection from noncancer health risks:
$RF = THQ \times RfD$
Where: THQ = Target hazard quotient (unitless)
RfD = Reference dose (mg/kg)/day for a route of exposure; see paragraph *"c"* for source.

AT = Averaging time (years); time over which exposure is averaged and potential adverse effects may occur

Abs = Absorption factor (unitless); portion of exposed contaminant absorbed by the body

ER_c = Exposure rate by a child (soil: mg/day, water: l/day)

EF_c = Exposure frequency by a child (days/year)

ED_c = Exposure duration by a child (years)

BW_c = Body weight of exposed child (kg)

ER_a = Exposure rate by an adult (soil: mg/day, water: l/day)

EF_a = Exposure frequency by an adult (days/year)

ED_a = Exposure duration by an adult (years)

BW_a = Body weight of exposed adult (kg)

CF = Conversion factor: 10^{-6} kg/mg for soils; 1 (unitless) for water

b. Carcinogenic classification of chemicals. The potential carcinogenicity of chemicals will be based on the weight-of-evidence classification system utilized by the U.S. Environmental Protection Agency (EPA). Risk-based concentrations will be based on cancer health effects for individual chemicals that are classified as Group A or Group B. The risk-based concentration for an individual chemical will be based on noncancer health effects for chemicals that are classified as Group C, Group D or Group E. In the absence of such classification for a chemical, the Group D classification will be assumed. Noncancer risks for a Group A or Group B chemical will be included in the determination of cumulative noncancer risk in accordance with subrule 137.10(7), if a reference dose exists for that chemical. Cancer risk associated with a Group C chemical shall be included in the determination of cumulative cancer risk in accordance with subrule 137.10(7), if a cancer slope factor exists for that chemical.

c. Source of toxicity values. EPA's Integrated Risk Information System (IRIS) shall be the primary source of information on toxicity factors (e.g., oral reference doses and oral slope factors), carcinogenic classification for chemicals, and the target organs. Such information that is not available on IRIS shall be obtained from other sources consistent with current EPA guidelines. The Iowa department of public health shall be consulted regarding toxicity values not available on IRIS. Absorption factors for dermal soil exposure shall be based on best available information, which will usually be obtained from EPA guidance documents.

137.5(4) *Statewide standards for groundwater.*

a. Protected groundwater source. Statewide standards for groundwater in a protected groundwater source will be the enforceable Maximum Contaminant Level (MCL) established by the EPA pursuant to the Safe Drinking Water Act, if an MCL exists. If no enforceable MCL exists, the statewide standard for chemicals will be the lifetime health advisory level (HAL) as provided in the latest "Drinking Water Regulations and Health Advisories" by the EPA's Office of Water or equivalent. If no MCL or HAL exists, the statewide standard for a chemical will be calculated using Formula I and input variables for groundwater ingestion in accordance with Table I.

b. Groundwater in a nonprotected groundwater source. The statewide standard for a chemical in groundwater in a nonprotected groundwater source will be five times the statewide standard for the chemical in a protected groundwater source or a risk-based concentration using Formula I with input variables specified in Table I, whichever is larger. The statewide standards for groundwater in a nonprotected groundwater source are based on groundwater ingestion only.

Table I

Input Variables for Risk-Based Statewide Standards for Groundwater from Protected and Nonprotected Groundwater Sources

Parameter	Units	Cancer Group	Protected	Nonprotected
TR	unitless	A, B	5×10^{-6}	1×10^{-4}
SF	$[(mg/kg)/day]^{-1}$	A, B, C	Chem.-spec.	Chem.-spec.*
THQ	unitless	C	0.02	0.1/1*

Parameter	Units	Cancer Group	Protected	Nonprotected
		D, E	0.2	1
RfD	(mg/kg)/day	C, D, E	Chem.-spec.	Chem.-spec.
AT	years	A - E	70	70
Abs	unitless	A - E	1	1
ER_c	l/day	A - E	1	1
EF_c	days/yr	A - E	0	0
ED_c	years	A - E	6	6
BW_c	kg	A - E	15	15
ER_a	l/day	A - E	2	2
EF_a	days/yr	A - E	365	365
ED_a	years	A - E	70	70
BW_a	kg	A - E	70	70
CF	unitless	A - E	1	1

The risk-based concentration using Formula I for Cancer Group C chemicals that have an SF value established per paragraph 137.5(3)"c"* will be the larger of a value based on the risk factor for protection from noncancer health risks with a THQ = 0.1 or the risk factor for protection from cancer health risks. Risk-based concentrations using Formula I for Cancer Group C chemicals that do not have an SF value established per paragraph 137.5(3)*"c"* will be a value based on the risk factor for protection from noncancer health risks with a THQ = 1.

137.5(5) *Statewide standards for soil.* Statewide standards for chemicals in soil, except lead, will be calculated using Formula I based on incidental ingestion of soil and dust and dermal contact with soil with input variables in accordance with Table II. The statewide standard for lead in soil shall be 400 mg/kg.

Table II

Input Variables for Statewide Soil Standards

			Route of Exposure	
Parameter	Units	Cancer Group	Oral	Dermal
TR	unitless	A, B	5×10^{-6}	5×10^{-6}
SF	$[(mg/kg)/day]^{-1}$	A, B, C*	Chem.-spec.	Chem.-spec.
THQ	unitless	C*	0.1/1	0.1/1
		D, E	1	1
RfD	(mg/kg)/day	C, D, E	Chem.-spec.	Chem.-spec.
AT	years	A, B	70	70
		C, D, E	6	6
Abs	unitless	A - E	1	Chem.-spec.
ER_c	mg/day	A - E	200	560**
EF_c	days/yr	A - E	350	350
ED_c	years	A - E	6	6
BW_c	kg	A - E	15	15
ER_a	mg/day	A - E	100	400**
EF_a	days/yr	A - E	350	350
ED_a	years	A, B	24	24

		C, D, E	0	0
BW_a	kg	A - E	70	70
CF	kg/mg	A - E	10^{-6}	10^{-6}

The risk-based concentration using Formula I for Cancer Group C chemicals that have an SF value established per paragraph 137.5(3)"c"* will be the larger of a value based on the risk factor for protection from noncancer health risks with a THQ = 0.1 or the risk factor for protection from cancer health risks. Risk-based concentrations using Formula I for Cancer Group C chemicals that do not have an SF value established per paragraph 137.5(3)*"c"* will be a value based on the risk factor for protection from noncancer health risks with a THQ = 1.

**Dermal exposure rate is based on 2,800 cm^2 of exposed skin on a child with 0.2 mg/cm^2 of soil adhering to the child's skin and 5,700 cm^2 of exposed skin on an adult with 0.07 mg/cm^2 of soil adhering to the adult's skin per each dermal exposure event. A dermal exposure event is assumed to be one event per day of exposure.

137.5(6) *Statewide standards for surface water.* Water quality standards pursuant to 567—Chapter 61 shall be considered statewide standards for surface water. If a promulgated water quality standard does not exist for a contaminant of concern, the department may establish an appropriate standard in a manner consistent with 567—Chapter 61.

137.5(7) *Statewide standards for air.* Ambient air quality standards pursuant to 567—Chapter 28 constitute statewide standards for air. Air emission sources must meet air quality emission standards as set forth in 567—Chapters 20 through 31 inclusively, as applicable. Any relevant air quality standard that is subsequently promulgated by statute or rule shall become a statewide standard for air upon the effective date of adoption by the state. In the absence of applicable, adopted standards, site-specific air standards must be met, in accordance with subrule 137.6(9), when air quality issues are addressed at a site.

137.5(8) *Point of exposure for statewide standards.* The point of exposure associated with the use of only statewide standards in the determination of compliance will be assumed to be anywhere and everywhere, except for surface water. The point of exposure associated with the use of statewide standards for surface water will be assumed to be the point of groundwater or other site runoff immediately before it discharges to the surface water body.

137.5(9) *Practical quantification limits.* In no case will the statewide standard be less than the practical quantification limit, as determined by the department.

137.5(10) *Maintenance of statewide standards.* The toxicity values, absorption factors for dermal exposure to soils, and promulgated standards that are a basis for statewide standards are subject to periodic revision due to actions not governed under this rule. The department in conjunction with the Iowa department of public health will maintain a guidance document that contains a current list of toxicity values, absorption factors for dermal exposure to soils, target organs for cumulative noncarcinogenic health risks, promulgated standards, and the resultant statewide standards that will be readily available to the public. This guidance document will reference all the sources of the information. In the absence of a dermal slope factor or a dermal reference dose for a chemical, the oral slope factor or oral reference dose will be used with adjustments made to account for differences in oral and dermal absorption rates in accordance with current EPA guidance. Statewide standards for individual sites will be locked-in at the beginning of the site assessment process (rule 137.8(455H)). If a statewide standard does not exist for a chemical, it will be the department's responsibility to establish a statewide standard, pursuant to subrules 137.5(4) and 137.5(5), for groundwater and soil, and to add the newly established statewide standard to the comprehensive list of statewide standards in the guidance document maintained by the department.