iemiscdata: Viewing Tables & Their Associated Notes

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Contents

Load the packages

Note: If you wish to replicate the R code below, then you will need to copy and paste the following commands in R first to make sure you have all the packages loaded:

```
install.load::load_package("iemiscdata", "pander", "knitr")
# load needed packages using the load_package function from the install.load
# package (it is assumed that you have already installed these packages)

# set the pander options
panderOptions("missing", "")
panderOptions("table.alignment.default", "left")
panderOptions("table.alignment.rownames", "left")
```

```
panderOptions("table.split.cells", Inf)
panderOptions("table.split.table", Inf)
```

Table 2-1: Runoff depth for selected CN's and rainfall amounts & notes

```
data(runoff_depth)
data(runoff_depth_notes)
# load the data from iemiscdata (containing Table 2-1: Runoff depth for
# selected CN's and rainfall amounts & notes)

pander(runoff_depth)
```

Rainfall (in)	Runoff depth (in) for curve number of 40	Runoff depth (in) for curve number of 45	Runoff depth (in) for curve number of 50	Runoff depth (in) for curve number of 55	Runoff depth (in) for curve number of 60	Runoff depth (in) for curve number of 65	Runoff depth (in) for curve number of 70	Runoff depth (in) for curve number of 75	Runoff depth (in) for curve number of 80	Runoff depth (in) for curve number of 85	Runoff depth (in) for curve number of 90	Runoff depth (in) for curve number of 95	Runoff depth (in) for curve number of 98
1	0	0	0	0	0	0	0	0.03	0.08	0.17	0.32	0.56	0.79
1.2	0	0	0	0	0	0	0.03	0.07	0.15	0.27	0.46	0.74	0.99
1.4	0	0	0	0	0	0.02	0.06	0.13	0.24	0.39	0.61	0.92	1.18
1.6	0	0	0	0	0.01	0.05	0.11	0.2	0.34	0.52	0.76	1.11	1.38
1.8	0	0	0	0	0.03	0.09	0.17	0.29	0.44	0.65	0.93	1.29	1.58
2	0	0	0	0.02	0.06	0.14	0.24	0.38	0.56	0.8	1.09	1.48	1.77
2.5	0	0	0.02	0.08	0.17	0.3	0.46	0.65	0.89	1.18	1.53	1.96	2.27
3	0	0.02	0.09	0.19	0.33	0.51	0.71	0.96	1.25	1.59	1.98	2.45	2.77
3.5	0.02	0.08	0.2	0.35	0.53	0.75	1.01	1.3	1.64	2.02	2.45	2.94	3.27
4	0.06	0.18	0.33	0.53	0.76	1.03	1.33	1.67	2.04	2.46	2.92	3.43	3.77
4.5	0.14	0.3	0.5	0.74	1.02	1.33	1.67	2.05	2.46	2.91	3.4	3.92	4.26
5	0.24	0.44	0.69	0.98	1.3	1.65	2.04	2.45	2.89	3.37	3.88	4.42	4.76
6	0.5	0.8	1.14	1.52	1.92	2.35	2.81	3.28	3.78	4.3	4.85	5.41	5.76
7	0.84	1.24	1.68	2.12	2.6	3.1	3.62	4.15	4.69	5.25	5.82	6.41	6.76
8	1.25	1.74	2.25	2.78	3.33	3.89	4.46	5.04	5.63	6.21	6.81	7.4	7.76
9	1.71	2.29	2.88	3.49	4.1	4.72	5.33	5.95	6.57	7.18	7.79	8.4	8.76
10	2.23	2.89	3.56	4.23	4.9	5.56	6.22	6.88	7.52	8.16	8.78	9.4	9.76
11	2.78	3.52	4.26	5	5.72	6.43	7.13	7.81	8.48	9.13	9.77	10.39	10.76
12	3.38	4.19	5	5.79	6.56	7.32	8.05	8.76	9.45	10.11	10.76	11.39	11.76
13	4	4.89	5.76	6.61	7.42	8.21	8.98	9.71	10.42	11.1	11.76	12.39	12.76
14	4.65	5.62	6.55	7.44	8.3	9.12	9.91	10.67	11.39	12.08	12.75	13.39	13.76
15	5.33	6.36	7.35	8.29	9.19	10.04	10.85	11.63	12.37	13.07	13.74	14.39	14.76

```
pander(runoff_depth_notes)
```

Note Number (*)	Notes
1	Interpolate the values shown to obtain runoff depths for CN's or rainfall amounts not shown. {Table 2-1: Runoff depth for selected CN's and rainfall amounts *1}

Table 2-2a: Runoff curve numbers for urban areas & notes

```
data(cn_urban)
data(cn_urban_notes)
# load the data from iemiscdata (containing Table 2-2a: Runoff curve numbers
# for urban areas & notes)

pander(cn_urban)
```

Cover type and hydrologic condition	Average percent impervious area *2	Curve numbers for hydrologic soil group A	Curve numbers for hydrologic soil group B	Curve numbers for hydrologic soil group C	Curve numbers for hydrologic soil group D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) *3					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) *4		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96

Cover type and hydrologic condition	Average percent impervious area *2	Curve numbers for hydrologic soil group A	Curve numbers for hydrologic soil group B	Curve numbers for hydrologic soil group C	Curve numbers for hydrologic soil group D
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) *5		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c: Runoff curve numbers for other agricultural lands).					

```
pander(cn_urban_notes)
```

Note Number (*)	Notes
1	Average runoff condition, and Ia = 0.2S. {Table 2-2a: Runoff curve numbers for urban areas *1}
2	The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3	CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4	Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5	Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b: Runoff curve numbers for cultivated agricultural lands & notes

```
data(cn_agricultural)
data(cn_agricultural_notes)
# load the data from iemiscdata (containing Table 2-2b: Runoff curve numbers
# for cultivated agricultural lands & notes)
```

```
pander(cn_agricultural)
```

Cover type	Treatment *2	Hydrologic condition *3	Curve numbers for hydrologic soil group A	Curve numbers for hydrologic soil group B	Curve numbers for hydrologic soil group C	Curve numbers for hydrologic soil group D
Fallow	Bare soil		77	86	91	94
Fallow	Crop residue cover (CR)	Poor	76	85	90	93
Fallow	Crop residue cover (CR)	Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
Row crops	Straight row (SR)	Good	67	78	85	89
Row crops	SR + CR	Poor	71	80	87	90
Row crops	SR + CR	Good	64	75	82	85
Row crops	Contoured (C)	Poor	70	79	84	88
Row crops	Contoured (C)	Good	65	75	82	86
Row crops	C + CR	Poor	69	78	83	87
Row crops	C + CR	Good	64	74	81	85
Row crops	Contoured & terraced (C&T)	Poor	66	74	80	82
Row crops	Contoured & terraced (C&T)	Good	62	71	78	81
Row crops	C&T+ CR	Poor	65	73	79	81

Cover type	Treatment *2	Hydrologic condition *3	Curve numbers for hydrologic soil group A	Curve numbers for hydrologic soil group B	Curve numbers for hydrologic soil group C	Curve numbers for hydrologic soil group D
Row crops	C&T+ CR	Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
Small grain	SR	Good	63	75	83	87
Small grain	SR + CR	Poor	64	75	83	86
Small grain	SR + CR	Good	60	72	80	84
Small grain	C	Poor	63	74	82	85
Small grain	C	Good	61	73	81	84
Small grain	C + CR	Poor	62	73	81	84
Small grain	C + CR	Good	60	72	80	83
Small grain	C&T	Poor	61	72	79	82
Small grain	C&T	Good	59	70	78	81
Small grain	C&T+ CR	Poor	60	71	78	81
Small grain	C&T+ CR	Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
Close-seeded or broadcast legumes or rotation meadow	SR	Good	58	72	81	85
Close-seeded or broadcast legumes or rotation meadow	C	Poor	64	75	83	85
Close-seeded or broadcast legumes or rotation meadow	C	Good	55	69	78	83
Close-seeded or broadcast legumes or rotation meadow	C&T	Poor	63	73	80	83
Close-seeded or broadcast legumes or rotation meadow	C&T	Good	51	67	76	80

```
pander(cn_agricultural_notes)
```

Note Number (*)	Notes
1	Average runoff condition, and Ia=0.2S {Table 2-2b: Runoff curve numbers for cultivated agricultural lands *1}
2	Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.
3	Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good 20%), and (e) degree of surface roughness.
3	Poor: Factors impair infiltration and tend to increase runoff.
3	Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c: Runoff curve numbers for other agricultural lands & notes

```
data(cn_other_agricultural)
data(cn_other_agricultural_notes)
# load the data from iemiscdata (containing Table 2-2c: Runoff curve numbers
# for other agricultural lands & notes)
```

```
pander(cn_other_agricultural)
```

Cover type	Hydrologic condition	Curve numbers for hydrologic soil group A	Notes	Curve numbers for hydrologic soil group B	Curve numbers for hydrologic soil group C	Curve numbers for hydrologic soil group D
Pasture, grassland, or range–continuous forage for grazing. *2	Poor	68		79	86	89
Pasture, grassland, or range–continuous forage for grazing. *2	Fair	49		69	79	84
Pasture, grassland, or range–continuous forage for grazing. *2	Good	39		61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.		30		58	71	78
Brush–brush-weed-grass mixture with brush the major element. *3	Poor	48		67	77	83

Cover type	Hydrologic conditions	Curve numbers for hydrologic soil group A	Notes	Curve numbers for hydrologic soil group B	Curve numbers for hydrologic soil group C	Curve numbers for hydrologic soil group D
Brush–brush-weed-grass mixture with brush the major element. *3	Fair	35		56	70	77
Brush–brush-weed-grass mixture with brush the major element. *3	Good	30	*4	48	65	73
Woods–grass combination (orchard or tree farm). *5	Poor	57		73	82	86
Woods–grass combination (orchard or tree farm). *5	Fair	43		65	76	82
Woods–grass combination (orchard or tree farm). *5	Good	32		58	72	79
Woods. *6	Poor	45		66	77	83
Woods. *6	Fair	36		60	73	79
Woods. *6	Good	30	*4	55	70	77
Farmsteads–buildings, lanes, driveways, and surrounding lots.		59		74	82	86

```
pander(cn_other_agricultural_notes)
```

Note Number (*)	Notes
1	Average runoff condition, and Ia = 0.2S. {Table 2-2c: Runoff curve numbers for other agricultural lands *1}
2	Poor: <50%) ground cover or heavily grazed with no mulch.
2	Fair: 50 to 75% ground cover and not heavily grazed.
3	Poor: <50% ground cover.
3	Fair: 50 to 75% ground cover.
3	Good: >75% ground cover.
4	Actual curve number is less than 30; use CN = 30 for runoff computations.
5	CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6	Poor: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
6	Fair: Woods are grazed but not burned, and some forest litter covers the soil.
6	Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d: Runoff curve numbers for arid and semiarid rangelands & notes

```
data(cn_arid_semiarid)
data(cn_arid_semiarid_notes)
# load the data from iemiscdata (containing Table 2-2d: Runoff curve numbers
# for arid and semiarid rangelands & notes)
```

```
pander(cn_arid_semiarid)
```

Cover type	Hydrologic condition *2	Curve numbers for hydrologic soil group A *3	Curve numbers for hydrologic soil group B	Curve numbers for hydrologic soil group C	Curve numbers for hydrologic soil group D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Fair		71	81	89
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Fair		48	57	63
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Fair		58	73	80
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
Sagebrush with grass understory.	Fair		51	63	70
Sagebrush with grass understory.	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88

Cover type	Hydrologic condition *2	Curve numbers for hydrologic soil group A *3	Curve numbers for hydrologic soil group B	Curve numbers for hydrologic soil group C	Curve numbers for hydrologic soil group D
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Fair	55	72	81	86
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Good	49	68	79	84

```
pander(cn_arid_semiarid_notes)
```

Note Number (*)	Notes
1	Average runoff condition, and Ia, = 0.2S. For range in humid regions, use table 2-2c: Runoff curve numbers for other agricultural lands
2	Poor: <30% ground cover (litter, grass, and brush overstory).
2	Fair: 30 to 70% ground cover.
2	Good: > 70% ground cover.
3	Curve numbers for group A have been developed only for desert shrub.

Table from Appendix A: Hydrologic Soil Groups (HSGs) & notes

```
data(hsg)
data(hsg_definitions)
# load the data from iemiscdata (containing Table from Appendix A: Hydrologic
# Soil Groups (HSGs) & notes)
```

```
pander(hsg)
```

Hydrologic Soil Group (HSG)	Soil textures
A	Sand, loamy sand, or sandy loam
B	Silt loam or loam
C	Sandy clay loam
D	Clay loam, silty clay loam, sandy clay, silty clay, or clay

```
pander(hsg_definitions)
```

Definitions	Drainage
Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission (greater than 0.30 in/hr).	
Group B soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).	
Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.15 in/hr).	
Group D soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).	Some soils in the list are in group D because of a high water table that creates a drainage problem. Once these soils are effectively drained, they are placed in a different group. For example, Ackerman soil is classified as A/D. This indicates that the drained Ackerman soil is in group A and the undrained soil is in group D.

US EPA National Primary Drinking Water Regulations Contaminants Table & notes

```
data(USA_primary_water_contaminants)
data(USA_primary_water_contaminants_notes)
# load the data from iemiscdata (containing US EPA National Primary Drinking
# Water Regulations Contaminants Table & notes)
```

```
pander(USA_primary_water_contaminants)
```

Contaminant	MCLG (mg/L)[2]	MCL or TT1 (mg/L)[2]	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Cryptosporidium	0	TT3	Gastrointestinal illness (such as diarrhea, vomiting, and cramps)	Human and animal fecal waste

Contaminant	MCLG1 (mg/L)2	MCL or TT1 (mg/L)2	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Giardia lamblia	0	TT3	Gastrointestinal illness (such as diarrhea, vomiting, and cramps)	Human and animal fecal waste
Heterotrophic plate count (HPC)		TT3	HPC has no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.	HPC measures a range of bacteria that are naturally present in the environment
Legionella	0	TT3	Legionnaire's Disease, a type of pneumonia	Found naturally in water; multiplies in heating systems
Total Coliforms (including fecal coliform and E. Coli) Quick reference guide	Rule Sum-mary 0	5.0%4	Not a health threat in itself; it is used to indicate whether other potentially harmful bacteria may be present5	Coliforms are naturally present in the environment; as well as feces; fecal coliforms and E. coli only come from human and animal fecal waste.
Turbidity		TT3	Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (such as whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria. These organisms can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.	Soil runoff
Viruses (enteric)	0	TT3	Gastrointestinal illness (such as diarrhea, vomiting, and cramps)	Human and animal fecal waste
Bromate	0	0.010	Increased risk of cancer	Byproduct of drinking water disinfection
Chlorite	0.8	1.0	Anemia; infants and young children: nervous system effects	Byproduct of drinking water disinfection
Haloacetic acids (HAA5)	n/a6	0.060	Increased risk of cancer	Byproduct of drinking water disinfection
Total Trihalomethanes (TTHMs)	–> n/a6	==== >–> 0.080	~~Liver, k~~idney or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection
Chloramines (as Cl2)	MRDLG=4	MRDL=4.0	Eye/nose irritation; stomach discomfort, anemia	Water additive used to control microbes
Chlorine (as Cl2)	MRDLG=4	MRDL=4.0	Eye/nose irritation; stomach discomfort	Water additive used to control microbes

Contaminant	MCLG1 (mg/L)2	MCL or TT1 (mg/L)2	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Chlorine dioxide (as ClO2)	MRDLG=0.8	MRDL=0.81	Anemia; infants and young children: nervous system effects	Water additive used to control microbes
Antimony	0.006	0.006	Increase in blood cholesterol; decrease in blood sugar	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic Quick reference guide Consumer fact sheet	0	0.010 as of 01/23/06	Skin damage or problems with circulatory systems, and may have increased risk of getting cancer	Erosion of natural deposits; runoff from orchards, runoff from glass and electronics production wastes
Asbestos (fiber > 10 micrometers)	7 million fibers per liter (MFL)	7 MFL	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits
Barium	2	2	Increase in blood pressure	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Beryllium	0.004	0.004	Intestinal lesions	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries
Cadmium	0.005	0.005	Kidney damage	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints
Chromium (total)	0.1	0.1	Allergic dermatitis	Discharge from steel and pulp mills; erosion of natural deposits

Contaminant	MCLG1 (mg/L)2	MCL or TT1 (mg/L)2	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Copper	1.3	TT7; Action Level=1.3	Short term exposure: Gastrointestinal distress Long term exposure: Liver or kidney damage People with Wilson's Disease should consult their personal doctor if the amount of copper in their water exceeds the action level	Corrosion of household plumbing systems; erosion of natural deposits
Cyanide (as free cyanide)	0.2	0.2	Nerve damage or thyroid problems	Discharge from steel/metal factories; discharge from plastic and fertilizer factories
Fluoride	4.0	4.0	Bone disease (pain and tenderness of the bones); Children may get mottled teeth	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories
Lead Quick reference guide Rule information	0	TT7; Actio	n Level=0.015 Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits
Mercury (inorganic)	0.002	0.002	Kidney damage	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and croplands
Nitrate (measured as Nitrogen)	10	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Nitrite (measured as Nitrogen)	1	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Selenium	0.05	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum refineries; erosion of natural deposits; discharge from mines

Contaminant	MCLG (mg/L)[2]	MCL or TT[1] (mg/L)[2]	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Thallium	0.0005	0.002	Hair loss; changes in blood; kidney, intestine, or liver problems	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories
Acrylamide	0	TT[8]	Nervous system or blood problems; increased risk of cancer	Added to water during sewage/wastewater treatment
Alachlor	0	0.002	Eye, liver, kidney or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops
Atrazine	0.003	0.003	Cardiovascular system or reproductive problems	Runoff from herbicide used on row crops
Benzene	0	0.005	Anemia; decrease in blood platelets; increased risk of cancer	Discharge from factories; leaching from gas storage tanks and landfills
Benzo(a)pyrene (PAHs)	0	0.0002	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines
Carbofuran	0.04	0.04	Problems with blood, nervous system, or reproductive system	Leaching of soil fumigant used on rice and alfalfa
Carbon tetrachloride	0	0.005	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities
Chlordane	0	0.002	Liver or nervous system problems; increased risk of cancer	Residue of banned termiticide
Chlorobenzene	0.1	0.1	Liver or kidney problems	Discharge from chemical and agricultural chemical factories
2,4-D	0.07	0.07	Kidney, liver, or adrenal gland problems	Runoff from herbicide used on row crops
Dalapon	0.2	0.2	Minor kidney changes	Runoff from herbicide used on rights of way
1,2-Dibromo-3-chloropropane (DBCP)	0	0.0002	Reproductive difficulties; increased risk of cancer	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards

Contaminant	MCLG[1] (mg/L)[2]	MCL or TT[1] (mg/L)[2]	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
o-Dichlorobenzene	0.6	0.6	Liver, kidney, or circulatory system problems	Discharge from industrial chemical factories
p-Dichlorobenzene	0.075	0.075	Anemia; liver, kidney or spleen damage; changes in blood	Discharge from industrial chemical factories
1,2-Dichloroethane	0	0.005	Increased risk of cancer	Discharge from industrial chemical factories
1,1-Dichloroethylene	0.007	0.007	Liver problems	Discharge from industrial chemical factories
cis-1,2-Dichloroethylene	0.07	0.07	Liver problems	Discharge from industrial chemical factories
trans-1,2-Dichloroethylene	0.1	0.1	Liver problems	Discharge from industrial chemical factories
Dichloromethane	0	0.005	Liver problems; increased risk of cancer	Discharge from drug and chemical factories
1,2-Dichloropropane	0	0.005	Increased risk of cancer	Discharge from industrial chemical factories
Di(2-ethylhexyl) adipate	0.4	0.4	Weight loss, liver problems, or possible reproductive difficulties.	Discharge from chemical factories
Di(2-ethylhexyl) phthalate	0	0.006	Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories
Dinoseb	0.007	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables
Dioxin (2,3,7,8-TCDD)	0	0.00000003	Reproductive difficulties; increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories
Diquat	0.02	0.02	Cataracts	Runoff from herbicide use
Endothall	0.1	0.1	Stomach and intestinal problems	Runoff from herbicide use
Endrin	0.002	0.002	Liver problems	Residue of banned insecticide

Contaminant	MCLG[1] (mg/L)[2]	MCL or TT[1] (mg/L)[2]	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Epichlorohydrin	0	TT[8]	Increased cancer risk, and over a long period of time, stomach problems	Discharge from industrial chemical factories; an impurity of some water treatment chemicals
Ethylbenzene	0.7	0.7	Liver or kidneys problems	Discharge from petroleum refineries
Ethylene dibromide	0	0.00005	Problems with liver, stomach, reproductive system, or kidneys; increased risk of cancer	Discharge from petroleum refineries
Glyphosate	0.7	0.7	Kidney problems; reproductive difficulties	Runoff from herbicide use
Heptachlor	0	0.0004	Liver damage; increased risk of cancer	Residue of banned termiticide
Heptachlor epoxide	0	0.0002	Liver damage; increased risk of cancer	Breakdown of heptachlor
Hexachlorobenzene	0	0.001	Liver or kidney problems; reproductive difficulties; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories
Hexachlorocyclopentadiene	0.05	0.05	Kidney or stomach problems	Discharge from chemical factories
Lindane	0.0002	0.0002	Liver or kidney problems	Runoff/leaching from insecticide used on cattle, lumber, gardens
Methoxychlor	0.04	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock
Oxamyl (Vydate)	0.2	0.2	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, and tomatoes
Polychlorinated biphenyls (PCBs)	0	0.0005	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemicals
Pentachlorophenol	0	0.001	Liver or kidney problems; increased cancer risk	Discharge from wood preserving factories
Picloram	0.5	0.5	Liver problems	Herbicide runoff
Simazine	0.004	0.004	Problems with blood	Herbicide runoff

Contaminant	MCLG1 (mg/L)2	MCL or TT1 (mg/L)2	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Styrene	0.1	0.1	Liver, kidney, or circulatory system problems	Discharge from rubber and plastic factories; leaching from landfills
Tetrachloroethylene	0	0.005	Liver problems; increased risk of cancer	Discharge from factories and dry cleaners
Toluene	1	1	Nervous system, kidney, or liver problems	Discharge from petroleum factories
Toxaphene	0	0.003	Kidney, liver, or thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle
2,4,5-TP (Silvex)	0.05	0.05	Liver problems	Residue of banned herbicide
1,2,4-Trichlorobenzene	0.07	0.07	Changes in adrenal glands	Discharge from textile finishing factories
1,1,1-Trichloroethane	0.20	0.2	Liver, nervous system, or circulatory problems	Discharge from metal degreasing sites and other factories
1,1,2-Trichloroethane	0.003	0.005	Liver, kidney, or immune system problems	Discharge from industrial chemical factories
Trichloroethylene	0	0.005	Liver problems; increased risk of cancer	Discharge from metal degreasing sites and other factories
Vinyl chloride	0	0.002	Increased risk of cancer	Leaching from PVC pipes; discharge from plastic factories
Xylenes (total)	10	10	Nervous system damage	Discharge from petroleum factories; discharge from chemical factories
Alpha particles	none ——— —- 0	15 pic-ocuries per Liter (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation

Contaminant	MCLG (mg/L)(2)	MCL or TT1 (mg/L)(2)	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Beta particles and photon emitters	none ——— —- 0	4 millirems per year	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation
Radium 226 and Radium 228 (combined)	none ——— —- 0	5 pCi/L	Increased risk of cancer	Erosion of natural deposits
Uranium	0	30 ug/L as of 12/08/03	Increased risk of cancer, kidney toxicity	Erosion of natural deposits

`pander(USA_primary_water_contaminants_notes)`

Note Number (*)	Notes
1	Definitions:
1	Maximum Contaminant Level Goal (MCLG) - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.
1	Maximum Contaminant Level (MCL) - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
1	Maximum Residual Disinfectant Level Goal (MRDLG) - The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
1	Treatment Technique (TT) - A required process intended to reduce the level of a contaminant in drinking water.
1	Maximum Residual Disinfectant Level (MRDL) - The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
2	Units are in milligrams per liter (mg/L) unless otherwise noted. Milligrams per liter are equivalent to parts per million (PPM).
3	EPA's surface water treatment rules require systems using surface water or ground water under the direct influence of surface water to
3.a	Disinfect their water, and
3.b	Filter their water, or

Note Number (*)	Notes
3.c	Meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels:
3.c	Cryptosporidium: Unfiltered systems are required to include Cryptosporidium in their existing watershed control provisions
3.c	Giardia lamblia: 99.9% removal/inactivation.
3.c	Viruses: 99.99% removal/inactivation.
3.c	Legionella: No limit, but EPA believes that if Giardia and viruses are removed/inactivated, according to the treatment techniques in the Surface Water Treatment Rule, Legionella will also be controlled.
3.c	Turbidity: For systems that use conventional or direct filtration, at no time can turbidity (cloudiness of water) go higher than 1 Nephelometric Turbidity Unit (NTU), and samples for turbidity must be less than or equal to 0.3 NTUs in at least 95 percent of the samples in any month. Systems that use filtration other than the conventional or direct filtration must follow state limits, which must include turbidity at no time exceeding 5 NTUs.
3.c	Heterotrophic Plate Count (HPC): No more than 500 bacterial colonies per milliliter.
3.c	Long Term 1 Enhanced Surface Water Treatment: Surface water systems or groundwater under the direct influence (GWUDI) systems serving fewer than 10,000 people must comply with the applicable Long Term 1 Enhanced Surface Water Treatment Rule provisions (such as turbidity standards, individual filter monitoring, Cryptosporidium removal requirements, updated watershed control requirements for unfiltered systems).
3.c	Long Term 2 Enhanced Surface Water Treatment Rule: This rule applies to all surface water systems or ground water systems under the direct influence of surface water. The rule targets additional Cryptosporidium treatment requirements for higher risk systems and includes provisions to reduce risks from uncovered finished water storage facilities and to ensure that the systems maintain microbial protection as they take steps to reduce the formation of disinfection byproducts.
3.c	Filter Backwash Recycling: This rule requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the state.
4	No more than 5.0% samples total coliform-positive (TC-positive) in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Every sample that has total coliform must be analyzed for either fecal coliforms or E. coli if two consecutive TC-positive samples, and one is also positive for E.coli fecal coliforms, system has an acute MCL violation.
5	Fecal coliform and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Disease-causing microbes (pathogens) in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These pathogens may pose a special health risk for infants, young children, and people with severely compromised immune systems.
6	Although there is no collective MCLG for this contaminant group, there are individual MCLGs for some of the individual contaminants:
6	Trihalomethanes: bromodichloromethane (zero); bromoform (zero); dibromochloromethane (0.06 mg/L): chloroform (0.07 mg/L.
6	Haloacetic acids: dichloroacetic acid (zero); trichloroacetic acid (0.02 mg/L); monochloroacetic acid (0.07mg/L). Bromoacetic acid and dibromoacetic acid are regulated with this group but have no MCLGs.

Note Number (*)	Notes
7	Lead and copper are regulated by a treatment technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L.
8	Each water system must certify, in writing, to the state (using third-party or manufacturer's certification) that when acrylamide and epichlorohydrin are used to treat water, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows:
8	Acrylamide = 0.05% dosed at 1 mg/L (or equivalent)
8	Epichlorohydrin = 0.01% dosed at 20 mg/L (or equivalent)

US EPA Secondary Drinking Water Standards Table & notes

```
data(USA_secondary_water_contaminants)
data(USA_secondary_water_contaminants_notes)
# load the data from iemiscdata (containing US EPA Secondary Drinking Water
# Standards Table & notes)
```

```
pander(USA_secondary_water_contaminants)
```

Contaminant	Secondary MCL	Noticeable Effects above the Secondary MCL
Aluminum	0.05 to 0.2 mg/L*	colored water
Chloride	250 mg/L	salty taste
Color	15 color units	visible tint
Copper	1.0 mg/L	metallic taste; blue-green staining
Corrosivity	Non-corrosive	metallic taste; corroded pipes/ fixtures staining
Fluoride	2.0 mg/L	tooth discoloration
Foaming agents	0.5 mg/L	frothy, cloudy; bitter taste; odor
Iron	0.3 mg/L	rusty color; sediment; metallic taste; reddish or orange staining
Manganese	0.05 mg/L	black to brown color; black staining; bitter metallic taste
Odor	3 TON (threshold odor number)	"rotten-egg", musty or chemical smell
pH	6.5 - 8.5	low pH: bitter metallic taste; corrosion high pH: slippery feel; soda taste; deposits
Silver	0.1 mg/L	skin discoloration; graying of the white part of the eye
Sulfate	250 mg/L	salty taste
Total Dissolved Solids (TDS)	500 mg/L	hardness; deposits; colored water; staining; salty taste
Zinc	5 mg/L	metallic taste

```
pander(USA_secondary_water_contaminants_notes)
```

Note Number (*)	Notes
1	mg/L is milligrams of substance per liter of water.

Table 3-1: Roughness coefficients (Manning's n) for sheet flow

```
data(nsheetflow)
data(nsheetflow_notes)
# load the data from iemiscdata (containing Table 3-1: Roughness coefficients
# (Manning's n) for sheet flow & notes)
```

```
pander(nsheetflow)
```

Surface description	n *1
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover 20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses *2	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:*3	
Light underbrush	0.4
Dense underbrush	0.8

```
pander(nsheetflow_notes)
```

Note Number (*)	Notes
1	The n values are a composite of information compiled by Engman (1986).
2	Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.
3	When selecting n, consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

Greenhouse Gases – Percent Contribution to Total Greenhouse Effect (Wikipedia)

```
data(greenhouse_gases_cloudy_wikipedia)
data(greenhouse_gases_cloudy_notes_wikipedia)
# load the data from iemiscdata [containingGreenhouse Gases -- Percent
# Contribution to Total Greenhouse Effect & notes (Wikipedia)]
```

```
pander(greenhouse_gases_cloudy_wikipedia)
```

Contributor	K&T (1997) – Clear Sky	K&T (1997) – With Clouds	Schmidt (2010) – Clear Sky	Schmidt (2010) – With Clouds
Water vapor	60	41	67	50
Clouds		31		25
CO2	26	18	24	19
O3	8			
N2O + CH4	6			
Other		9	9	7

```
pander(greenhouse_gases_cloudy_notes_wikipedia)
```

Note Number (*)	Notes
1	K&T (1997) used 353 ppm CO2 and calculated 125 W/m2 total clear-sky greenhouse effect; relied on single atmospheric profile and cloud model. “”With Clouds“” percentages are from Schmidt (2010) interpretation of K&T (1997).
2	Schmidt (2010) used 1980 climatology with 339 ppm CO2 and 155 W/m2 total greenhouse effect; accounted for temporal and 3-D spatial distribution of absorbers.
3	Greenhouse gases not listed explictly in the table include sulfur hexafluoride, hydrofluorocarbons and perfluorocarbons.

Data Sources

United States Department of Agriculture Natural Resources Conservation Service Conservation Engineering Division, “Urban Hydrology for Small Watersheds Technical Release 55 (TR-55)”, June 1986, pages 2-3, 2-5 - 2-8, 3-3, 4-1 - 4-2, A-1, https://web.archive.org/web/20230810204711/https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=22162.wba [Recovered with the Internet Archive: Wayback Machine]

United States (US) Environmental Protection Agency (EPA): "National Primary Drinking Water Regulations", https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations.

United States (US) Environmental Protection Agency (EPA): "Secondary Drinking Water Standards: Guidance for Nuisance Chemicals", https://www.epa.gov/sdwa/secondary-drinking-water-standards-guidance-nuisance-chemicals.

Wikimedia Foundation, Inc. Wikipedia, 25 August 2023, "Greenhouse gas", https://en.wikipedia.org/wiki/Greenhouse_gas.

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