

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Water Quality Control Commission

REGULATION NO. 41 - THE BASIC STANDARDS FOR ~~GROUND-WATER~~GROUNDWATER

5 CCR 1002-41

41.1 AUTHORITY

These regulations are promulgated pursuant to the Colorado Water Quality Control Act, sections 25-8-101 through 25-8-703 C.R.S., (1982 and 1985 Supp.). In particular, they are promulgated under the following sections 25-8-202, 25-8-203, and 25-8-204.

41.2 PURPOSE

The purpose of these regulations is to establish statewide standards and a system for classifying ~~ground water~~groundwater and adopting water quality standards for such classifications to protect existing and potential beneficial uses of ~~ground-water~~groundwaters.

41.3 DEFINITIONS

The following definitions are applicable to these regulations.

1. "Activity" is any operation that may discharge or cause a discharge of pollutants to ~~ground water~~groundwaters including but not limited to, point source discharges, pits, ponds, and lagoons used for storage, treatment and/or disposal of pollutants, land application of wastewater, and non-point source discharges. Activity shall not include related operations, no matter how closely integrated physically or legally.
2. "Agricultural Uses" are the existing or potential future uses of ~~ground-water~~groundwater for the cultivation of soil, the production of crops, and/or the raising of livestock.
3. "Background Level" is the level of any parameter in the ~~ground-water~~groundwater within a specified area as determined by representative measurements of the ~~ground-water~~groundwater quality unaffected by the activity.
4. "Contamination" is that condition where the concentration level of a pollutant exceeds naturally occurring background levels.
5. "Domestic Uses" are those existing or potential future uses of ~~ground-water~~groundwater for household or family use, including, but not limited to: drinking, gardening, municipal, and/or farmstead uses.
6. "Existing Activity" means any activity whose plans and specifications have been approved by the Division, or which has commenced or completed construction, prior to the effective date of the 1990 amendments to this regulation.
7. "~~Ground Water~~Groundwater" are subsurface waters in a zone of saturation which are or can be brought to the surface of the ground or to surface waters through wells, springs, seeps or other discharge areas.

8. "New Activity" means any activity that does not qualify as an existing activity.
9. "Parameter" is the physical, chemical, biological, or radiological constituent or characteristic of the ~~ground-water~~groundwater such as; temperature, pH, and ~~ground-water~~groundwater level.
10. "Point Of Compliance" means a vertical surface that is located at some specified distance hydrologically downgradient of the activity being monitored for compliance; provided that the Commission may establish a point of compliance other than a vertical surface on a site-specific basis pursuant to section 41.6 (E).
11. "Site Boundary" means the outermost perimeter of the property or lease boundary of a facility for which the owner and/or operator has control.
12. "Specified Area" is that area within which the ~~ground-water~~groundwater is classified.
13. "Standard" is a narrative and/or numeric restriction established by these regulations and applied to ~~ground-water~~groundwaters to protect one or more existing or potential future uses.
14. "TDS" is the total dissolved solids in water.

41.4 CLASSIFICATION OF ~~GROUND-WATER~~GROUNDWATERS

A. ~~Ground-Water~~Groundwater Classifications

The Commission hereby establishes the following classifications for ~~ground-water~~groundwater:

1. Domestic Use - Quality
2. Agricultural Use - Quality
3. Surface Water Quality Protection
4. Potentially Usable Quality
5. Limited Use and Quality

B. Criteria Used to Identify Classifications for ~~Ground-Water~~Groundwater

The ~~ground-water~~groundwater classifications shall be implemented and applied to ~~ground water~~groundwaters within a specified area (as determined in accordance with section 41.4(c) based upon use, quality and other information demonstrating the following:

1. ~~Ground-water~~Groundwater within a specified area shall be classified "Domestic Use - Quality" when:
 - a. ~~Ground-water~~Groundwater is used for domestic use within the specified area; or
 - b. If ~~ground-water~~groundwater is not currently used for domestic use within the specified area, the available information, including information regarding background levels, demonstrates that future domestic use of water within the specified area is reasonably probable; or
 - c. The most recent State Engineer's well records or applicable water court decrees reveal that ~~ground-water~~groundwater is permitted or decreed for domestic use within the

specified area, unless other information demonstrates that domestic use is not being made of the ~~ground water~~groundwater and is not likely to be made; or

- d. The background levels are generally adequate to assure compliance with the Human Health Standards listed in Table 1 and TDS levels are less than 10,000 mg/l.

The determination of whether or not background levels are generally adequate shall be made considering the number of parameters that meet or exceed table Values, the extent of any exceedances of table Values, the risk to the public health associated with any such exceedance, and the adequacy of the database available for such determinations.

2. ~~Ground water~~Groundwater within a specified area shall be classified "Agricultural Use - Quality" when:

- a. ~~Ground water~~Groundwater is used for agricultural use within the specified area; or
- b. If ~~ground water~~groundwater is not used for agricultural use within the specified area, the available information, including information regarding background levels, demonstrates that future agricultural use of water within the specified area is reasonably probable; or
- c. The most recent State Engineer's well records or applicable water court decrees reveal that ~~ground water~~groundwater is permitted or decreed for agricultural use within the specified area, unless other information demonstrates that agricultural use is not being made of the ~~ground water~~groundwater and is not likely to be made; or
- d. The background levels are generally adequate to assure compliance with the Agricultural Standards listed in Table 3 and TDS levels are less than 10,000 mg/l.

The determination of whether or not background levels are generally adequate shall be made considering the number of parameters that meet or exceed table values, the extent of any exceedances of table values, the risk to crops and/or livestock associated with any such exceedance, and the adequacy of the database available for such determinations.

3. ~~Ground water~~Groundwater within a specified area shall be classified "Surface Water Quality Protection" when:

A proposed or existing activity does or will impact ~~ground water~~groundwaters such that water quality standards of classified surface water bodies within the specified area will be exceeded.

4. ~~Ground water~~Groundwater within a specified area shall be classified "Potentially Usable Quality" when:

- a. TDS levels are less than 10,000 mg/l; and
- b. ~~Ground water~~Groundwater is not used for domestic or agricultural uses within the specified area; and
- c. Background levels are generally not adequate to assure compliance with the Human Health and Agricultural Standards listed in Tables 1 and 3, or the information is insufficient to make such a determination; and
- d. Domestic or agricultural use of the ~~ground water~~groundwater can be reasonably expected in the future, considering background levels of water quality; geologic and hydrologic conditions; the degree to which any particular types of pollutants present are subject to treatment; the economic reasonableness of such treatment; the impact of

treatment requirements on water quantity; whether or not pollution arises from natural sources; and other relevant factors.

5. ~~Ground water~~Groundwater within a specified area shall be classified "Limited Use and Quality" when:
 - a. TDS levels are equal to or in excess of 10,000 mg/l; or
 - b. The ~~ground water~~groundwater has been exempted under Rule 324(B) of the "Rules and Regulations, Rules of Practice and Procedure" (2 CCR 404-1) of the Oil and Gas Conservation Commission, pursuant to the Colorado Oil and Gas Conservation Act, Title 60, Article 34, C.R.S. (1982); or
 - c. The criteria specified in sections 41.4(B)1, 2, 3, or 4 are not met.

C. Specified Area

1. When an activity exists or is proposed, the shape, depth, boundaries, and extent of a specified area shall be determined by considering:
 - a. the presence, extent, and nature of existing uses of ~~ground water~~groundwater that may be affected by the activity, and the nature of reasonably expected future uses of ~~ground water~~groundwater that may be affected by the activity; and
 - b. the nature and location of the activity and of its discharge; and
 - c. existing ~~ground water~~groundwater quality that may be affected by the activity; and
 - d. relevant geologic and hydrogeologic conditions, including but not limited to the presence of ~~ground water~~groundwater hydrologically connected to surface waters and recharge areas.
2. In the absence of an existing or proposed activity, the shape, depth, boundaries, and extent of a specified area may be determined by considering:
 - a. the presence, extent, and nature of existing uses of ~~ground water~~groundwater and the nature of reasonably expected future uses of ~~ground water~~groundwater; and
 - b. existing ~~ground water~~groundwater quality; and
 - c. relevant geologic and hydrogeologic conditions, including but not limited to the presence of ~~ground water~~groundwater hydrologically connected to surface waters and recharge areas.

41.5 ~~GROUND WATER~~GROUNDWATER QUALITY STANDARDS

The water quality standards specified in subsection B below are deemed necessary and appropriate to protect ~~ground water~~groundwater uses as specified in section 41.4, and shall be adopted to protect such classified uses. The standards specified in subsections A and C apply to all State ~~ground water~~groundwaters, unless alternative site-specific standards have been adopted for a specified area pursuant to subsection D below.

A. Narrative Standards

1. ~~Ground Water~~**Groundwater** shall be free from pollutants not listed in the tables referred to in section 41.5(B), which alone or in combination with other substances, are in concentrations shown to be:
 - a. Carcinogenic, mutagenic, teratogenic, or toxic to human beings, and/or,
 - b. A danger to the public health, safety, or welfare.
2. Determinations made pursuant to section 41.7 of specific numerical limitations under this subsection shall be based upon the best scientific information currently available.

B. Numeric Standards

1. The numeric standards shall be measured as total concentrations unless otherwise specified in Tables 1 through 4.
2. When a ~~ground water~~**groundwater** has a multi-use classification, the most restrictive standard for a parameter shall apply.
3. The following numeric standards shall apply:
 - a. "Domestic Use-Quality" - The Human Health and Secondary Drinking Water Standards listed in Tables 1 and 2, respectively, except as specified in section 41.5(B)5 or 41.5(B)(6).
 - b. "Agricultural Use - Quality" - The Agricultural Standards listed in Table 3, except as specified in section 41.5(B)5.
 - c. "Surface Water Quality Protection" - The standards necessary to prevent the exceedance of surface waters standards.
 - d. "Potentially Usable Quality" - appropriate standards considering those factors listed in section 41.4(B)(4)(d).
4. The TDS limitation listed in Table 4 shall apply to the following classes:

"Agricultural Use - Quality"

"Surface Water Quality Protection"

"Potentially Usable Quality"
5. For ~~ground water~~**groundwater** classified "Domestic Use - Quality" or "Agricultural Use - Quality," where a table value is exceeded by the background level, the applicable standard for that parameter shall be either 1) the table value or 2) the background level for that parameter. This determination shall be made considering the increased risk to public health, crops, or livestock associated with the background levels, the extent of the exceedance above the table value, the degree to which the pollution is deemed correctable and subject to treatment; and the economic reasonableness of such treatment requirements.
6. The Commission may adopt site-specific standards in lieu of those listed in Tables 1, 2, 3 and 4 taking into account the factors prescribed in Section 25-8-204(4), C.R.S. and section 41.4. The downgrading factors described in Regulation No. 31, section 6(2)(B) of the Basic Standards and Methodology for Surface Water shall not apply to the establishment of site-specific standards under this subsection.

C. Statewide Standards

1. Radioactive materials and Organic pollutants in ~~ground water~~groundwaters shall not exceed the following levels, unless alternative, site-specific standards for these substances have been adopted by the Commission:
 - a. For radioactive materials and organic pollutants listed in subsections 2 and 3 below, levels shall not exceed those specified in those subsections.
 - b. For all other radioactive materials and organic pollutants, they shall be maintained at the lowest practical level.
 - c. Where site-specific standards have been adopted, they shall apply in lieu of the standards set forth in this subsection.
2. Radioactive Materials Standards:

Radioactive Materials Standards¹

Parameter	Standard
Americium ²	0.15
Cesium 134	80
Plutonium 239 ² , and 240 ²	0.15
Radium 226 ² and 228 ²	5
Strontium 90 ²	8
Thorium 230 ² and 232 ²	60
Tritium	20,000

pCi/l = Picocuries Per Liter

¹ In site-specific cases, when it has been demonstrated that there are negligible differences between the results of dissolved (filtered) samples and total (unfiltered) samples, then dissolved results may be utilized for implementing the radioactive material standards.

² Radionuclide samples for these materials should be analyzed using unfiltered (total) samples.

3. Interim Organic Pollutant Standards:

Note that all standards in table A are being adopted as “interim standards.” These interim standards will remain in effect until alternative permanent standards are adopted by the Commission in revisions to this regulation or site-specific standards determinations. Although fully effective with respect to current regulatory applications, these interim standards shall not be considered final or permanent standards subject to restrictions such as antibacksliding or downgrading.

TABLE A

~~GROUND WATER~~GROUNDWATER ORGANIC CHEMICAL STANDARDS

(in micrograms per liter)

Parameter	CAS No.	STANDARD ¹
Acenaphthene	83-32-9	420
Acetochlor	34256-82-1	140
Acetone	67-64-1	6300
Acrolein	107-02-8	3.5
Acrylamide ^{C,8}	79-06-1	0.022
Acrylonitrile ^C	107-13-1	0.065
Alachlor	15972-60-8	2.0 ^M
Aldicarb	116-06-3	7.0 ^M
Aldicarb Sulfone	1646-88-4	7.0 ^M
Aldicarb Sulfoxide	1646-87-3	7.0 ^M
Aldrin ^C	309-00-2	0.0021
Aniline ^C	62-53-3	6.1
Anthracene (PAH)	120-12-7	2100
Aramite ^C	140-57-8	1.4
Atrazine	1912-24-9	3.0 ^M
Azobenzene ^C	103-33-3	0.32
Benzene ^{C,2}	71-43-2	5.0 ^M
Benzidine ^C	92-87-5	0.00015
Benzo(a)anthracene (PAH) ^{C,8}	56-55-3	0.0048 <u>0.16</u>
Benzo(a)pyrene (PAH) ^{C,86}	50-32-8	0.0048 to 0.2^M <u>0.016</u>
Benzo(b)fluoranthene (PAH) ^{C,8}	205-99-2	0.0048 <u>0.16</u>

TABLE A

~~GROUND WATER~~GROUNDWATER ORGANIC CHEMICAL STANDARDS

(in micrograms per liter)

Parameter	CAS No.	STANDARD ¹
Benzo(k)fluoranthene (PAH) ^{C,8}	207-08-9	0.0048 <u>1.6</u>
Benzotrichloride ^C	98-07-7	0.0027
Benzyl chloride ^C	100-44-7	0.21
Bis(chloromethyl)ether (BCME) ^C	542-88-1	0.00016
Biphenyl ^C	92-52-4	4.4
Bromate ^C	15541-45-4	0.05
Bromobenzene	108-86-1	56
Bromodichloromethane (THM) ^{C, 7}	75-27-4	0.56
Bromoform (THM) ^{C, 7}	75-25-2	4
Butyl benzyl phthalate	85-68-7	1,400
Carbofuran ⁶	1563-66-2	35 to 40 ^M
Carbon tetrachloride ^{C, 6}	56-23-5	0.5 to 5 ^M
Chlordane ^{C, 6}	57-74-9	0.10 to 2 ^M
Chlordecone ^C	143-50-0	.0035
Chlorethyl ether (BIS-2) ^C	111-44-4	0.032
4-Chloro-3-methylphenol	59-50-7	210
Chlorobenzene	108-90-7	100 ^M
Chloroform (THM) ^{C, 7}	67-66-3	3.5
Chloroisopropyl ether (BIS-2)	108-60-1	280
4-Chloro-3-methylphenol	59-50-7	210
Chloronap h thalene	91-58-7	560
Chlorophenol, 2-	95-57-8	35

TABLE A

~~GROUND WATER~~GROUNDWATER ORGANIC CHEMICAL STANDARDS

(in micrograms per liter)

Parameter	CAS No.	STANDARD ¹
Chlorpyrifos <u>Chlorphrifos</u>	2921-88-2	21
Chrysene (PAH) ^{C,8}	218-01-9	0.0048 <u>16</u>
Dalapon	75-99-0	200 ^M
DDD ^C	72-54-8	0.15
DDE ^C	72-55-9	0.1
DDT ^C	50-29-3	0.1
Di(2-ethylhexyl)adipate	103-23-1	400 ^M
Dibenzo(a,h)anthracene (PAH) ^{C,8}	53-70-3	0.0048 <u>0.016</u>
1,2-Dibromo-3-Chloropropane (DBCP)	96-12-8	0.2 ^M
Dibromochloromethane (chlorodibromomethane) (THM) ^{3a, 7}	124-48-1	14
Dibromoethane 1,2 ^C	106-93-4	0.018
Dicamba	1918-00-9	210
Dichloroacetic acid ^C	79-43-6	0.7
Dichlorobenzene 1,2	95-50-1	600 ^M
Dichlorobenzene 1,3	541-73-1	94
Dichlorobenzene 1,4	106-46-7	75 ^M
Dichlorobenzidine ^C	91-94-1	0.078
Dichloroethane 1,2 ^{C, 6}	107-06-2	0.38 to 5 ^M
Dichloroethylene 1,1	75-35-4	7 ^M
Dichloroethylene 1,2-cis ⁶	156-59-2	14 to 70 ^M
Dichloroethylene 1,2-trans ⁶	156-60-5	140 or 100 ^M
Dichloromethane (methylene chloride) ^{C,6,8}	75-09-2	5.6 or 5 ^M

TABLE A

~~GROUND WATER~~GROUNDWATER ORGANIC CHEMICAL STANDARDS

(in micrograms per liter)

Parameter	CAS No.	STANDARD ¹
Dichlorophenol 2,4	120-83-2	21
Dichlorophenoxyacetic acid (2,4-D)	94-75-7	70 ^M
Dichloropropane 1,2 ^{C, 6}	78-87-5	0.52 to 5 ^M
Dichlorvos ^C	62-73-7	0.12
Diclorobenzidine^C	91-94-1	0.078
Dieldrin ^C	60-57-1	0.002
Diethyl phthalate	84-66-2	5,600
Diisopropylmethylphosphonate (DIMP) ⁴	1445-75-6	8
Dimethylphenol 2,4	105-67-9	140
Di-n-butyl phthalate	84-74-2	700
Dinitro-o-cresol 4,6	534-52-1	0.27
Dinitrophenol 2,4	51-28-5	14
Dinitrotoluene 2,4 ^C	121-14-2	0.11
Dinoseb	88-85-7	7 ^M
Dioxane 1,4- ^C	123-91-1	0.35
Dioxin (2,3,7,8 TCDD) ^{C, 6}	1746-01-6	2.2x10 ⁻⁷ to 3.0x10 ^{-5, M}
Diphenylhydrazine 1,2 ^C	122-66-7	0.044
Diquat ⁶	85-00-7	15 to 20 ^M
Endosulfan	115-29-7	42
Endosulfan sulfate	1031-07-8	42
Endosulfan, alpha	959-98-8	42
Endosulfan, beta	33213-65-9	42

TABLE A

~~GROUND WATER~~GROUNDWATER ORGANIC CHEMICAL STANDARDS

(in micrograms per liter)

Parameter	CAS No.	STANDARD ¹
<u>Endosulfan sulfate</u>	<u>1031-07-8</u>	<u>42</u>
Endothall	145-73-3	100 ^M
Endrin	72-20-8	2 ^M
Endrin aldehyde	7421-93-4	2.1
Epichlorohydrin ^C	106-89-8	3.5
Ethylbenzene	100-41-4	700 ^M
Ethylene Dibromide ^{C, 6} (1,2-dibromoethane)	106-93-4	0.02 to 0.05 ^M
Ethylene glycol monobutyl ether (EGBE) (2-Butoxyethanol)	111-76-2	700
Ethylhexyl phthalate (BIS-2) ^{C, 6} (DEHP)	117-81-7	2.5 to 6 ^M
Fluoranthene (PAH)	206-44-0	280
Fluorene (PAH)	86-73-7	280
Folpet ^C	133-07-3	10
Furmecyclo ^C	60568-05-0	1.2
Glyphosate	1071-83-6	700 ^M
Heptachlor ^{C, 6}	76-44-8	0.008 to 0.4 ^M
Heptachlor epoxide ^{C, 6}	1024-57-3	0.004 to 0.2 ^M
Hexachlorobenzene ^{C, 6}	118-74-1	0.022 to 1.0 ^M
Hexachlorobutadiene	87-68-3	0.45
Hexachlorocyclohexane, Alpha ^C	319-84-6	0.0056
Hexachlorocyclohexane, Gamma (Lindane)	58-89-9	0.2 ^M
Hexachlorocyclopentadiene ^{6-50^M} <u>(HCCPD)</u>	77-47-4	42 to 50 ^M

TABLE A

~~GROUND WATER~~GROUNDWATER ORGANIC CHEMICAL STANDARDS

(in micrograms per liter)

Parameter	CAS No.	STANDARD ¹
Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-hcdd) ^C	19408-74-3	5.60E-06
Hexachloroethane ^C	67-72-1	0.88
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)^{3b}	121-82-4	0.42
Hexanone 2	591-78-6	35
Hydrazine/Hydrazine sulfate ^C	302-01-2	0.012
Indeno (1,2,3-cd) pyrene (PAH) ^{C,8}	193-39-5	0.00480.16
Isophorone ^{3a}	78-59-1	140
Malathion	121-75-5	140
Methanol	67-56-1	14,000
Methoxychlor ⁶	72-43-5	35 to 40 ^M
Methylene bis(N,N'-dimethyl)aniline 4,4' ^C	101-61-1	0.76
Metribuzin	21087-64-9	180
Mirex	2385-85-5	1.4
Naphthalene (PAH)	91-20-3	140
Nitrobenzene	98-95-3	14
Nitrophenol 4	100-02-7	56
Nitrosodimethylamine N ^C (NDMA)	62-75-9	0.00069
Nitrosodiphenylamine N^C	86-30-6	7.1
N-Nitrosodiethanolamine ^C	1116-54-7	0.013
Nitrosodiphenylamine N^C	86-30-6	7.1
N-Nitrosodi-n-propylamine ^C	621-64-7	0.005

TABLE A

~~GROUND WATER~~GROUNDWATER ORGANIC CHEMICAL STANDARDS

(in micrograms per liter)

Parameter	CAS No.	STANDARD ¹
N-Nitroso-N-Methylethylamine ^C	10595-95-6	0.0016
Oxamyl (vydate) ⁶	23135-22-0	175 to 200 ^M
PCBs ^{C, 5, 6}	1336-36-3	0.0175 to 0.5 ^M
Pentachlorobenzene	608-93-5	5.6
Pentachlorophenol ^{C, 6}	87-86-5	0.088 to 1.0 ^M
Perchlorate	7790-98-9	4.9
Phenol	108-95-2	2,100
Picloram	1918-02-1	490
Prometon	1610-18-0	100
Propylene oxide ^C	75-56-9	0.15
Pyrene (PAH)	129-00-0	210
Quinoline ^C	91-22-5	0.012
Simazine	122-34-9	4 ^M
Styrene	100-42-5	100 ^M
Tetrachlorobenzene 1,2,4,5	95-94-3	2.1
Tetrachloroethane 1,1,2,2 ^C	79-34-5	0.18
Tetrachloroethylene (PCE) ^{C, 6}	127-18-4	17 or 5 ^M
Tetrahydrofuran	109-99-9	6,300
Toluene ⁶	108-88-3	560 to 1,000 ^M
Total Trihalomethanes (TTHMs) ⁷	N/A	80 ^M
Toxaphene ^{C, 6}	8001-35-2	0.032 to 3 ^M
<u>Trichloroacetic acid^C</u>	<u>76-03-9</u>	<u>0.52</u>

TABLE A		
GROUND WATER <u>GROUNDWATER</u> ORGANIC CHEMICAL STANDARDS		
(in micrograms per liter)		
Parameter	CAS No.	STANDARD ¹
Trichlorobenzene 1,2,4	120-82-1	70 ^M
Trichloroacetic acid^C	76-03-9	0.52
Trichloroethane 1,1,1 (1,1,1-TCA) ⁶	71-55-6	14,000 or 200 ^M
Trichloroethane 1,1,2 ^{3a, 6} (1,1,2-TCA)	79-00-5	2.8 to 5 ^M
Trichloroethylene (TCE)	79-01-6	5 ^M
Trichloropropane 1,2,3 ^{C, 8}	96-18-4	3.7E-4
Trichlorophenol 2,4,5	95-95-4	700
Trichlorophenol 2,4,6 ^C	88-06-2	3.2
Trichlorophenoxypropionic acid (2,4,5-tp) (Silvex)	93-72-1	50 ^M
Trimethylbenzene 1,2,3	526-73-8	67
Trimethylbenzene 1,2,4	95-63-6	67
Trimethylbenzene 1,3,5	108-67-8	67
Vinyl Chloride ^{C, 6}	75-01-4	0.023 to 2 ^M
Xylenes (total) ⁶	1330-20-7	1,400 to 10,000 ^M

Notes and Abbreviations:

¹ All standards are chronic or 30-day standards. They are based on information contained in EPA's Integrated Risk Information System (IRIS) and/or EPA lifetime health advisories for drinking water using a 10⁻⁶ incremental risk factor unless otherwise noted.

² The standard for Benzene has been established at the MCL (q.v. 41.17)

^{3a} Standards for Group C compounds that have both a published toxicity-reference dose (non-cancer) and carcinogenic risk toxicity data are and is calculated based on reference dose (non-cancer) toxicity data and then adjusted downward using an uncertainty factor of 10.

^{3b} Standard for Group C compound that has both a published reference dose (non-cancer) and carcinogenic toxicity data and is calculated based on the toxicity data (i.e., non-cancer-based or cancer-based) resulting in the most protective (lowest) water quality standard.

⁴ The Diisopropylmethylphosphonate (DIMP) standard was adopted in 1993 (q.v. 41.16)

⁵ PCBs are a class of chemicals that include aroclors, 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469-21-9, 11097-69-1, 11104-28-2, 11141-16-5, 12672-29-6, 11096-82-5, and 12674-11-2 respectively. The human-health criteria apply to total PCBs, i.e. the sum of all congener or all isomer analyses.

⁶ Whenever a range of standards is listed and referenced to this footnote, the first number in the range is a strictly health-based value, based on the Commission's established methodology for human health-based standards. The second number in the range is a maximum contaminant level, established under the federal Safe Drinking Water Act has been determined to be an acceptable level of this chemical in public water supplies, taking treatability and laboratory detection limits into account. The Commission intends that control requirements for this chemical be implemented to attain a level of ambient water quality that is at least equal to the first number in the range except as follows:

- Wherever the Commission has adopted alternative, site-specific standards for the chemical, the site-specific standards shall apply instead of these statewide standards.
- The implementing agency has determined that setting the protection level to the second number in the range is consistent with the current and reasonably anticipated future uses of the groundwater, factoring in site-specific information, such as: existing prohibitions on groundwater use; whether the location is within the boundaries of an existing or reasonably anticipated public water supply; the proximity of the site to existing and reasonably anticipated water wells; whether or not the aquifer can produce water at a rate capable of supporting the anticipated use; or it can be demonstrated that access to groundwater is prohibited, unavailable or present at insufficient quantities for reliable use.

The Commission does not intend the adoption of this range of standards to result in changes to clean-up requirements previously established by an implementing agency, unless such change is mandated by the implementing agency pursuant to its independent statutory authority.

⁷ For aquifer storage and recovery facilities, if the source of this chemical in ~~ground-water~~groundwater is potable water provided by a drinking water system with a Colorado PWSID that meets all applicable federal Safe Drinking Water Act and corresponding State requirements at the time that it is utilized for aquifer storage and recovery or artificial recharge, then the separate total trihalomethane standard will apply to the ~~ground-water~~groundwater in question, rather than the individual standards for bromodichloromethane, bromoform, chloroform, and/or dibromochloromethane. For any parameter for which there is a Maximum Containment Level (MCL) established by the Safe Drinking Water Act, as identified in Table A with Footnote "M", the MCL shall apply as the standard for groundwater when potable water is used for ASR or artificial recharge.

⁸ Mutagenic compound, age dependent factors were used in calculating standard.

N/A – not applicable

^C Carcinogens classified by the EPA as A, B1, or B2.

^M Drinking water MCL.

CAS No. - Chemical Abstracts Service Registry Number

THM - Halomethanes

4. Whenever the practical quantitation limit, or PQL, for a pollutant is higher (less stringent) than a standard listed in subsection 2 or 3 above, the PQL shall be used in regulating specific activities. PQL's may be established by the applicable implementing agency or in consultation with the Water Quality Control Division.
5. Nothing in this regulation shall be interpreted to preclude:
 - a. An agency responsible for implementation of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601, et seq., as amended, from selecting a remedial action and a point of compliance that are more or less stringent than would be achieved by compliance with the statewide numerical standards established in this subsection, or alternative site-specific standards adopted by the Commission, where a determination is made that such a variation is authorized pursuant to the applicable provisions of CERCLA; or
 - b. An agency responsible for implementation of Subtitle C of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901, et seq., as amended, or the Colorado Hazardous Waste Act, C.R.S. 25-15-101, et seq., as amended, from applying background levels or establishing "alternate concentration limits" and a point of compliance that differ from the statewide numerical standards established in this subsection, or alternative site-specific standards adopted by the Commission, for purposes of establishing hazardous waste management or corrective action

requirements, where a determination is made that such background levels or alternate concentration limits are authorized by the regulations adopted pursuant to these statutory authorities; or

- c. An agency responsible for implementation of a storage tank (ST) program, pursuant to C.R.S. 25-18-101 et seq., as amended, from issuing a regulatory determination, including a point of compliance, that is more or less stringent than would be achieved by compliance with the statewide numerical standards established in this subsection, or alternative site-specific standards adopted by the Commission, where a determination is made that the ~~ground-water~~groundwater quality protection criteria identified in applicable ST regulations are satisfied.

6. Interim Narrative Standard

- a. The “Interim Narrative Standard” in 41.5(C)(6)(b)(i) below is applicable to all ~~ground water~~groundwater, to which standards have not already been assigned in the state, with the exception of those areas where the total dissolved solids (TDS) are equal to or exceed 10,000 mg/l. This standard is applicable independent of and in addition to the statewide standards for radioactive materials and organic pollutants established in this section 41.5.C.
- b.
 - i. Until such time as use classifications and numerical standards are adopted for the ~~ground water~~groundwater on a site-specific basis throughout the state, and subject to the provisions of subsection (ii) below, ground-water quality shall be maintained for each parameter at whichever of the following levels is less restrictive:
 - (A) existing ambient quality as of January 31, 1994, or
 - (B) that quality which meets the most stringent criteria set forth in Tables 1 through 4 of “The Basic Standards for ~~Ground Water~~Groundwater.”
 - ii. The interim standard shall not be interpreted or applied as defining or limiting the potential need for remediation of contaminated ~~ground water~~groundwater where remedial requirements are established under state or federal law. It is the Commission's intent that, to the maximum degree technically feasible and economically reasonable, remedial efforts should be directed at cleaning up ~~ground water~~groundwater contaminated by human activities to a degree such that it is usable for all existing and potential beneficial uses; this interim narrative standard is not intended to define when such remediation is or is not feasible. Where contamination already exists, this interim standard is merely intended to assure that conditions are not allowed to deteriorate further pending remedial action. The appropriate level of clean-up to be achieved may be addressed by this Commission in a future classification and standard-setting proceeding, or by other agencies with jurisdiction over remedial actions.
 - iii. In applying this interim narrative standard, the Commission intends that agencies with authority to implement this standard will exercise their best professional judgment as to what constitutes adequate information to determine or estimate existing ambient quality, taking into account the location, sampling date, and quality of all available data. Data generated subsequent to January 31, 1994, shall be presumed to be representative of existing quality as of January 31, 1994, if the available information indicates that there have been no new or increased sources of ~~ground water~~groundwater contamination initiated in the area in question subsequent to that date. If available information is not adequate to otherwise determine or estimate existing ambient quality as of January 31, 1994, such ~~ground water~~groundwater quality for each parameter shall be assumed to

be no worse than the most stringent levels provided for in Tables 1 through 4 of "The Basic Standards for ~~Ground Water~~Groundwater," unless the Commission has adopted alternative numerical standards for a given specified area.

D. Site-specific radioactive materials and organic pollutant standards

1. In determining whether to adopt site-specific standards to apply in lieu of the statewide standards established in subsection C above, the Commission shall first determine the appropriate ~~ground water~~groundwater classifications within a specified area, in accordance with section 41.4.
2. The Commission shall then determine whether numerical standards other than some or all of the statewide standards established in subsection C above would be more appropriate for protection of the classified uses, taking into account the factors prescribed in section 25-8-204(4), C.R.S. and section 41.4. The downgrading factors described in Regulation No. 31, section 6(2)(B) of the Basic Standards and Methodologies for Surface Water shall not apply to the establishment of site-specific standards under this subsection.

41.6 POINT OF COMPLIANCE

- A. In order to effect compliance with ~~ground water~~groundwater standards, one or more points of compliance shall be established. The term "point of compliance" shall be assumed to cover situations with one or several points of compliance. An activity shall comply with ~~ground water~~groundwater quality standards established under section 41.5 at the point of compliance. The establishment of a point of compliance shall not be required at the time of classification of any ~~ground water~~groundwater pursuant to section 41.4. The point of compliance for those activities regulated by an implementing agency is discussed in subsection B of this section. Unless modified by the applicable implementing agency or the Commission, the criteria for establishing a point of compliance for the statewide standards established in section 41.5(C)(2) and (3) are set forth in subsection (C) of this section. For those activities regulated by the Water Quality Control Division through permit or control regulations, the point of compliance shall be established under the provisions of subsection (D) of this section. Nothing in this regulation shall lessen the Division's existing authority to consider these ~~ground water~~groundwater standards when setting limits for surface water discharges which impact ~~ground water~~groundwater. The Commission may establish points of compliance in lieu of those established by the Division or this rule, on a case-by-case basis as described in subsection (E).
- B. For the purposes of this subsection, the following agencies are referred to as "implementing agencies":

The Division of Reclamation, Mining and Safety; the State Engineer; the Oil and Gas Conservation Commission; and the state agencies responsible for activities related to the federal "Resource Conservation and Recovery Act of 1976", as amended, and related state programs.

Per the provisions of section 25-8-202 C.R.S., implementing agencies shall establish the point of compliance for those activities under their control. The points of compliance established in section 41.6 (C) and (D) of this regulation shall not apply to activities regulated by an implementing agency, unless the Commission has determined after rulemaking that the point of compliance established by the implementing agency is not adequate to satisfy the requirements of section 25-8-202(7). The Commission may then establish, through rulemaking, a site-specific point of compliance which shall supersede any point of compliance established by the implementing agencies.

- C. In the absence of a point of compliance established by the Division, and unless modified by the Commission in accordance with section 41.6 (E) or subject to alternative regulatory requirements

in accordance with section 41.5 (C)(5), the point of compliance for the statewide standards established in section 41.5 (C)(2) and (3) shall be located as follows.

1. For facilities at which ~~ground-water~~groundwater contamination existed as of September 30, 1989:
 - a. If the contamination is identified and reported to the division or other appropriate implementing agency on or before September 30, 1992, then the point of compliance shall be at whichever of the following locations is closest to the contamination source:
 - i. The site boundary; or
 - ii. The hydrologically downgradient limit of the area in which contamination exists when identified.
 - b. If the contamination is not identified and reported to the division or other appropriate implementing agency on or before September 30, 1992, then the point of compliance shall be at whichever of the following locations is closest to the contamination source:
 - i. The site boundary; or
 - ii. The hydrologically downgradient limit of the area in which contamination exists as of September 30, 1989; or
 - iii. If the location specified in (ii) can not be identified, then at the hydrologically downgradient limit of the area below the activity potentially impacting ~~ground-water~~groundwater quality.
2. For all other facilities, at the hydrologically downgradient limit of the area below the activity potentially impacting ~~ground-water~~groundwater quality.

D. ~~Within a specified area for which ground water quality classifications have been established and~~ Unless modified by the Commission in a site-specific hearing in accordance with section 41.6 (E), the point of compliance for those activities regulated by the Division through discharge permit regulations or control regulations shall be established by the Water Quality Control Division in accordance with the following criteria.

1. For all new and existing activities ~~that discharge to groundwater~~ the point of compliance will be set ~~as follows: at the end-of-pipe or some distance hydrologically downgradient from the discharge, but no further than the site boundary. The point of compliance shall be set at the distance that provides the highest degree of protection that is technologically and economically feasible, based on an evaluation of the information as may be available regarding the following criteria:~~
 - a. ~~Except for surface water discharges, at some distance hydrologically downgradient from the activity that is causing, or which has the potential to cause, the contamination, based on one of the following criteria, and selecting that distance closest to the activity:~~
 - i. ~~A specified distance, as determined by (b) below; or~~
 - ii. ~~The hydrologically downgradient limit of the area in which contamination has been identified; or~~

- iii. ~~The site boundary.~~
 - b. ~~In determining a specified distance the division shall take into consideration the following factors;~~
 - a. The hydrologically downgradient limit of the area below the activity potentially impacting groundwater quality;
 - bi. The classified use, established by the Commission, for any ~~ground water~~groundwater or surface water which could be impacted by contamination from the activity;
 - ii.c. The geologic and hydrologic characteristics of the site, such as depth to ~~ground water~~groundwater, ~~ground water~~groundwater flow direction and velocity, soil types, surface water impacts, dilution, and climate;
 - diii. The toxicity, mobility, and persistence in the environment of contaminants used or stored at the facility or discharged from the facility;
 - e. The hydraulic capacity of the wastewater treatment system;
 - ivf. The location of existing and potential future domestic use wells and eEstablished wellhead protection areas;
 - g. The location of other existing and potential beneficial uses of groundwater;
 - h. The treatment system design, including whether the design uses land treatment technologies or leachfields, and whether monitoring wells are appropriate and practical points of compliance;
 - i. The contamination or exceedance of water quality standards the activity has caused or has the potential to cause;
 - iv. The potential of the site as an aquifer recharge area; and
 - vi. Data and information related to~~Recommendations submitted by the facility owner or operator, including~~ technical and economic feasibility.
- 2e. For surface water discharges that impact ~~ground water~~groundwater, the point of compliance shall be established in accordance with the provisions of the Colorado Discharge Permit System Regulations, Regulation No. 61 (5 CCR 1002-61).
- 2. ~~For any new activity the point of compliance will be set as follows:~~
 - a. ~~Unless modified by the division as specified in (b) below, the point of compliance will be set at the hydrologically downgradient limit of the area below the activity potentially impacting ground water quality.~~
 - b. ~~The point of compliance determined in (a) above may be modified by the Division on a case-by-case basis with consideration of the following factors:~~
 - i. ~~The classified use, established by the Commission, for any ground water or surface water which could be impacted by contamination from the activity;~~

- ii. ~~The geologic and hydrologic characteristics of the site, such as depth to ground water, ground water flow direction and velocity, soil types, surface water impacts, and climate;~~
- iii. ~~The toxicity, mobility, and persistence in the environment of contaminants used or stored at the facility or discharged from the facility;~~
- iv. ~~Established wellhead protection areas;~~
- v. ~~The potential of the site as an aquifer recharge area; and~~
- vi. ~~Recommendations submitted by the facility owner or operator, including technical and economic feasibility.~~

E. When considering a request to adopt a site-specific point of compliance to apply in lieu of that established in subsection (C) or (D) above:

1. The Commission shall establish a more stringent site-specific point of compliance where determined necessary to protect human health and the environment, taking into account the potential for vertical migration of contamination, the number, quantity, nature, and persistence in the environment of the contaminants present, technological feasibility, economic reasonableness, upgradient levels of contamination, geohydrological data and features, the classified uses established by the Commission for any ~~ground water~~groundwater or surface water which would be impacted by contamination from the activity, and other environmental data or other relevant information as determined by the Commission; or
2. If the Commission determines that a less stringent point of compliance would protect human health and the environment, and the point of compliance established pursuant to subsection (C) or (D) is technologically infeasible or economically unreasonable, it shall establish an alternate site-specific point of compliance, taking into account the potential for vertical migration of contamination, the number, quantity, nature, and persistence in the environment of the contaminants present, technological feasibility, economic reasonableness, upgradient levels of contamination, point of use treatment, geohydrological data and features, the classified uses established by the Commission for any ~~ground water~~groundwater or surface water which would be impacted by contamination from the activity, and other environmental data or other relevant information as determined by the Commission.

41.7 IMPLEMENTATION

- A. Except for sections 41.5(C) and 41.6(A) and (B), these regulations shall not be deemed automatically applicable to any ~~ground water~~groundwaters of the State.
- B. The Commission is responsible for classifying the ~~ground water~~groundwaters of the State and promulgating water quality standards as set forth in sections 25-8-202(1)(a), 25-8-203 and 25-8-204, C.R.S.

The Commission may classify ~~ground water~~groundwaters and promulgate water quality standards in accordance with the provisions of sections 41.4 and 41.5 of the regulations, upon its own motion or upon petition submitted by the division, any other state agency, or any interested person, including a regulated entity or a person who may be affected by ~~ground water~~groundwater quality.

- C. The determination to accept or deny a petition for consideration under this section, and the scheduling of such petitions for hearing, shall be at the discretion of the Commission, provided, however, that the Commission shall be required to hear any petition for a sitespecific standard or a site-specific point of compliance for radioactive materials and organic pollutant standards submitted pursuant to section 41.5(D). In making such determinations the Commission shall consider the hardship or impact that inaction may have upon the petitioner, other interested persons, and the ~~ground-water~~groundwaters of the State; the relative hardships or impacts that may be caused where more than one petition is submitted or is pending; the stage of development of an appropriate data base for decision-making; the Commission's workload and priorities for action; and other relevant factors.
- D. Hearings under this section shall be held in accordance with section 24-4-103, C.R.S. and the Commission's Procedural Regulations.
- E. The Commission may consider a change in classifications or water quality standards based upon substantial new information demonstrating that the current classifications or standards should no longer apply. The determination to accept or deny a petition for consideration under this subsection shall be made in accordance with subsection B, above, provided that no ~~ground water~~groundwaters shall be considered for reclassification or changes in water quality standards more than once in any twelve month period.
- F. The Commission may grant variances from the standards specified in section 41.5 of these regulations on a case-by-case basis considering the factors listed in section 25-8-204(4) C.R.S., and where it is demonstrated by a preponderance of the evidence that a variance from the water quality standards specified in section 41.5 is most appropriate to the protection of the classified uses. The extent and duration of any such variance shall be made on a case-by-case basis.
- G. When the Commission has established statewide standards or classification(s) and standards for ~~ground-water~~groundwater in a specified area, those classifications and standards shall be used with respect to the regulation and subsequent enforcement of specific activities by the Commission, the Administration and other State agencies, consistent with applicable law.
- H. When the Commission has not established classification(s) and standards for ~~ground water~~groundwater in a specified area, the Commission recommends the classifications and standards set forth in these regulations as guidance for use by other State agencies in the implementation of ~~ground-water~~groundwater protection responsibilities, on a case-by-case basis, consistent with applicable law. This shall not be construed as a delegation by the Commission of its authority to classify ~~ground-water~~groundwater and promulgate water quality standards.
- I. Existing discharges of pollutants to ~~ground-water~~groundwater shall be deemed "activities" as defined in section 41.3(1), and are not exempt from regulation, unless specific statutory or regulatory provisions require otherwise.

41.8 SEVERABILITY

The provisions of these regulations are severable, and if any provisions or the application of the provisions to any circumstances is held invalid, the application of such provision to other circumstances, and the remainder of these regulations, shall not be affected thereby.

TABLE 1

TABLE 1	
Domestic Water Supply – Human Health Standards	
Parameter	Standard ¹
Biological	
Total Coliforms (30 day average)	2.2 ^a org/100 ml
Total Coliforms (max in 30 days)	23org/100 ml
Inorganic	
Antimony (Sb) ^{d, M}	0.006mg/l
Asbestos ^M	7,000,000fibers/Liter
Arsenic (As) ^{d, M}	0.01mg/l
Barium (Ba) ^{d, M}	2.0mg/l
Beryllium (Be) ^{d, M}	0.004mg/l
Cadmium (Cd) ^{d, M}	0.005mg/l
Chromium (Cr) ^{c, d, M}	0.1mg/l
Cyanide [Free] (CN) ^M	0.2mg/l
Fluoride (F) ^{d, M}	4.0mg/l
Lead (Pb) ^d	0.05mg/l
Mercury (inorganic) (Hg) ^{d, M}	0.002mg/l
Molybdenum (Mo) ^d	0.21 mg/l
Nickel (Ni) ^d	0.1mg/l
Nitrate (NO ₃) ^{d, M}	10.0mg/l as N
Nitrite (NO ₂) ^{d, M}	1.0mg/l as N
Total Nitrate+Nitrite (NO ₂ +NO ₃ -N) ^{d, f}	10.0mg/l as N
Selenium (Se) ^{d, M}	0.05mg/l
Silver (Ag) ^d	0.05mg/l
Thallium (Tl) ^{d, M}	0.002mg/l
Uranium (U) ^{d, 2}	0.0168 to 0.03 ^M mg/l
Radiological^{b, d}	
Gross Alpha Particle Activity ^{i, M}	15pCi/l
Beta and Photon Emitters ^e	4mrem/year

TABLE 2 Domestic Water Supply – Drinking Water Standards

Parameter	Standard
Chlorophenol	0.0002 mg/l
Chloride (Cl) ^{-d}	250 mg/l
Color	15 color units
Copper (Cu) ^{-d}	1 mg/l
Corrosivity	Noncorrosive
Foaming Agents	0.5 mg/l
Iron (Fe) ^{-d}	0.3 mg/l
Manganese (Mn) ^{-d}	0.05 mg/l
Odor	3 threshold odor numbers
pH	6.5 - 8.5
Phenol	0.3 mg/l
Sulfate (SO ₄) ^{-d}	250 mg/l
Zinc (Zn) ^{-d}	5 mg/l

TABLE 3 Agricultural Standards

Parameter	Standard
Aluminum (Al) ^{-d, f}	5 mg/l
Arsenic (As) ^{-d}	0.1 mg/l
Beryllium (Be) ^{-d}	0.1 mg/l
Boron (B) ^{-d, g}	0.75 mg/l
Cadmium (Cd) ^{-d}	0.01 mg/l
Chromium (Cr) ^{-d}	0.1 mg/l
Cobalt (Co) ^{-d}	0.05 mg/l
Copper (Cu) ^{-d}	0.2 mg/l
Fluoride (F) ^{-d}	2 mg/l
Iron (Fe) ^{-d}	5 mg/l
Lead (Pb) ^{-d, f}	0.1 mg/l
Lithium (Li) ^{-d, h}	2.5 mg/l
Manganese (Mn) ^{-d, j}	0.2 mg/l
Mercury (Hg) ^{-d, f}	0.01 mg/l
Nickel (Ni) ^{-d}	0.2 mg/l
Nitrite (NO ₂ - N) ^{-d, f}	10 mg/l as N
Nitrite & Nitrate (NO ₂ +NO ₃ - N) ^{-d, f}	100 mg/l as N
Selenium (Se) ^{-d}	0.02 mg/l
Vanadium (V) ^{-d}	0.1 mg/l
Zinc (Zn) ^{-d}	2 mg/l
pH	6.5 - 8.5

TABLE 4 TDS Water Quality Standards

Background TDS Value (mg/l)	Maximum Allowable TDS Concentrations
0 - 500	400 mg/l or 1.25 times the background level, whichever is least restrictive
501 - 10,000	1.25 times the background value
10,001 or greater	No limit

1 Chronic or 30-day standard based on information contained in EPA's Integrated Risk Information System (IRIS) using a 10⁻⁶ incremental risk factor.

2 Whenever a range of standards is listed and referenced to this footnote, the first number in the range is a strictly health-based value, based on the Commission's established methodology for human health-based standards. The second number in the range is a maximum contaminant level, established under the federal Safe Drinking Water Act that has been determined to be an acceptable level of this chemical in public water supplies, taking treatability and laboratory detection limits into account. The Commission intends that control requirements for this chemical be implemented to attain a level of ambient water quality that is at least equal to the first number in the range except as follows:

- Where ~~ground-water~~groundwater quality exceeds the first number in the range due to a release of contaminants that occurred prior to September 15, 2012, (regardless of the date of discovery or subsequent migration of such contaminants) clean-up levels for the entire contaminant plume shall be no more restrictive than the second number in the range or the ~~ground-water~~groundwater quality resulting from such release, whichever is more protective.
- Wherever the Commission has adopted alternative, site-specific standards for the chemical, the site-specific standards shall apply instead of these statewide standards.

The Commission does not intend the adoption of this range of standards to result in changes to clean-up requirements previously established by an implementing agency, unless such change is mandated by the implementing agency pursuant to its independent statutory authority.

a When the Membrane Filter Technique is used for analysis, the average of all samples taken within thirty days must be less than 1 organism per 100 milliliters of sample. When the Multiple Tube Fermentation Method is used for analysis, the limit is less than 2.2 org/100 ml.

b If the identity and concentration of each radionuclide in a mixture are known, the limiting value would be derived as follows: Determine, for each radionuclide in the mixture, the ratio between the quantity present in the mixture and the limit specified. The sum of such ratios for all radionuclides in the mixture shall not exceed "1" (i.e. unity). A radionuclide may be considered as not present in a mixture if the ratio of the concentration to the limit does not exceed 1/10 and the sum of such ratios for all radionuclides considered as not present in the mixture does not exceed 1/4.

c The chromium standard is based on the total concentration of both trivalent and hexavalent forms of dissolved chromium.

d Measured as dissolved concentration. The sample water shall be filtered through a 0.45 micron membrane filter prior to preservation. The total concentration (not filtered) may be required on a case-by-case basis if deemed necessary to adequately characterize the pollution caused by the activity for the protection of groundwater uses.

e If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem per year. Except for Tritium and Strontium 90 the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using the 168-hour data listed in "Maximum Permissible Body Burden and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure," NBS Handbook 69, as amended, August 1963, US Department of Commerce.

f These more stringent levels are necessary to protect livestock watering. Levels for parameters without this footnote are set to protect irrigated crops at the same level. Where a party can demonstrate that a livestock watering use of ~~ground~~ watergroundwater is not reasonably expected, the applicable standard for lead is 5.0 mg/l.

g This level is set to protect the following plants in ascending order of sensitivity: Pecan, Black Walnut, Persian (English) Walnut, Jerusalem Artichoke, Navy Bean, American Elm, Plum, Pear, Apple, Grape (Sultanina and Malaga), Kadota Fig, Persimmon, Cherry, Peach, Apricot, Thornless Blackberry, Orange, Avocado, Grapefruit, Lemon. Where a party can demonstrate that a crop watering use of ~~ground-water~~groundwater is not reasonably expected, the applicable standard for boron is 5.0 mg/l.

h This level protects all crops, except citrus which do not grow in Colorado and therefore a more stringent level of protection is not required.

i The Gross Alpha Activity standard excludes alpha activity due to Radon and Uranium.

j This standard is only appropriate where irrigation water is applied to soils with pH values lower than 6.0.

M Drinking water MCL.

41.9 Reserved.

41.10 Reserved.

41.11 Reserved.

41.30 STATEMENT OF BASIS, SPECIFIC STATUTORY AUTHORITY AND PURPOSE: APRIL 13, 2020 RULEMAKING; FINAL ACTION MAY 11, 2020; EFFECTIVE DATE JUNE 30, 2020.

The provisions of C.R.S. sections 25-8-202; 25-8-203; 25-8-204; 25-8-402, provide the specific statutory authority for adoption of this regulation. The Commission also adopted, in compliance with section 24-4-103(4) the following statement of basis and purpose.

BASIS AND PURPOSE

In this rulemaking the commission considered revisions to criteria and revisions to division point of compliance provisions. The commission adopted changes as detailed below.

I. Statewide Standards - Interim Organic Pollutant Standards

The commission adopted revised and new organic chemical standards in section 41.5(C)(3). In an effort to keep groundwater and surface water organic chemical standards consistent, the changes to section 41.5(C)(3) were also adopted for the statewide surface water organic chemical standards in Regulation No. 31 (Basic Standards and Methodologies for Surface Water).

In adopting these new and revised organic chemical standards, the commission continued to rely on its past policy decisions and precedence documented in Commission Policy 96-2, along with best science practices set forth in the CWA § 304(a) criteria development method. As per Departmental policy, the commission has relied on the United States Environmental Protection Agency's (EPA) Integrated Risk Information System (IRIS) as its first tier source of toxicological data. Review of the IRIS data that had been updated since the last revisions to 41.5(C)(3) indicated adoption of standards for four new chemicals (hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), CAS 121-82-4; 1,2,3-trimethylbenzene, CAS 526-73-8; 1,2,4-trimethylbenzene, CAS 95-63-6; and 1,3,5-trimethylbenzene, CAS 108-67-8) were necessary. Additionally, the water quality standards for benzo(a)pyrene (BaP), CAS 50-32-8 and related chemicals [benzo(a)anthracene, CAS 56-55-3; benzo(b)fluoranthene, CAS 205-99-2; benzo(k)fluoranthene, CAS 207-08-9; chrysene, CAS 218-01-9; dibenzo(a,h)anthracene, CAS 53-70-3; and indeno(1,2,3-cd)pyrene, CAS 193-39-5], needed to be revised. Water quality standards for RDX and the three trimethylbenzenes use updated exposure factors of a mean adult (21 years and older) body weight of 80 kilograms and a drinking water ingestion rate of 2.4 liters per day. Use of these updated exposure factors relies on more recent exposure data than those used to derive the exposure factors in the commission Policy 96-2. Policy 96-2 is a retrospective policy and will be updated accordingly to reflect the updated exposure factors at the time of the next review. Though, this will create misalignment with the exposure factors used previously to derive existing organic chemical standards in Regulation No. 41, the division will work towards bringing previous standards up-to-date as well, as resources to do so become available. Additional details regarding aspects of these standards revisions are provided below.

A. Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), CAS 121-82-4

RDX is characterized in IRIS with the cancer descriptor "Suggestive evidence of carcinogenic potential" per EPA 2005 guidelines. This designation is comparable to the cancer group designation of "C – Possible human carcinogen" from the 1986 EPA guidelines. Per Policy 96-2: "for Group C compounds that have both carcinogenic (cancer slope) and toxic (reference dose) data the Commission decided, in accordance with their past practice, to base the standards for these compounds on the reference dose approach, but to adjust the resulting standard with an uncertainty factor of 10 to account for any unknown carcinogenic effects." However, this approach

is not aligned with best science practices set forth in the CWA § 304(a) criteria development method for these types of chemicals, under which both cancer-based and non-cancer-based water quality standards would be calculated and the lower of the two standards selected for use protection. Therefore, the commission adopted the proposed calculation of the RDX Water Supply standard, which uses the lower, cancer-based water quality standard of 0.42 µg/L, based on the IRIS cancer slope factor of 0.008 per mg/kg-day. This approach follows the more protective, 304(a)-compliant approach of selecting the lower of the two calculated standards (cancer-based or non-cancer-based). Derivation of previous standards for “Group C carcinogens” has not been consistent; therefore, the division will, ongoing, follow the practices set forth in the CWA § 304(a) criteria development method for these types of chemicals. The division will also work towards bringing previous standards up-to-date, as resources to do so become available.

The commission also adopted a new footnote “3b” to Table A in Regulation No. 41 to reflect the updated approach used for RDX.

The Water Supply standard uses most of the default exposure assumptions from Policy 96-2, along with updated exposure factors of a mean adult (21 years and older) body weight of 80 kilograms and a drinking water ingestion rate of 2.4 liters per day, as discussed above.

B. Trimethylbenzenes

The commission adopted new Water Supply standards for 1,2,3-trimethylbenzene, CAS 526-73-8; 1,2,4-trimethylbenzene, CAS 95-63-6; and 1,3,5-trimethylbenzene, CAS 108-67-8, calculated using the non-cancer equations and most of the default exposure assumptions from Policy 96-2 in combination with the RfD of 0.01 mg/kg-day from IRIS. The Water Supply standards use updated exposure factors of a mean adult (21 years and older) body weight of 80 kilograms and a drinking water ingestion rate of 2.4 liters per day, as discussed above. The calculations resulted in Water Supply standards of 67 µg/L.

C. Benzo(a)pyrene (BaP), CAS 50-32-8 and related chemicals

The commission adopted a revised Water Supply standard for BaP based on updates to the EPA IRIS assessment. In addition to providing an updated cancer slope factor, the IRIS assessment identified BaP as a mutagen. Therefore, the standards adopted by the commission were calculated using age-dependent factors, following EPA 2005 guidance on risk assessment for mutagenic compounds and Minnesota’s Human Health-based Water Quality Standards Technical Support Document, in combination with the default Incremental Lifetime Cancer Risk of 1E-06 from Policy 96-2, and the oral cancer slope factor of 1 per mg/kg-day from IRIS. Age-bracketed upper 90th percentile, per capita, combined direct and indirect, water ingestion rates for community water sources from Table 3-13 of the 2019 revision to the Exposure Factors Handbook were used to derive the Water Supply standards.

Previously, water quality standards of several related polycyclic aromatic hydrocarbons (PAHs) [benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene] were set equal to those for BaP; therefore, the Water Supply standard for these PAHs was also revised. Table 1 summarizes the revised standards for BaP and the other, related PAHs adopted by the commission. The commission adopted revised standards for these PAHs calculated by applying the estimated order of potential potency (EOPP) factor, for each chemical relative to BaP, presented in EPA’s 1993 Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. In this approach, the potencies of other PAHs relative to benzo(a) pyrene are determined. These EOPP factors were applied using the revised cancer slope factor for BaP from IRIS and using age-dependent factors appropriate for use with mutagenic chemicals. Treatment of the related PAHs as mutagens, based on that determination for BaP, is consistent with the approach described in EPA’s 1993 guidance. Footnote 8 was added to indicate that BaP and related PAH standards

were calculated as mutagens. In 2010, EPA provided a draft of updated guidance, which applied new relative potency factors (RPFs). However, since the guidance was never finalized, the new RPFs are typically used in EPA risk assessment framework, and are thus not used for the derivation of the revised water quality standards.

Table 1. Summary of standards proposed for BaP and the other, related PAHs		
Parameter	CAS no.	Water Supply Standard (µg/L)
benzo(a)anthracene	56-55-3	0.16
benzo(a)pyrene	50-32-8	0.016
benzo(b)fluoranthene	205-99-2	0.16
benzo(k)fluoranthene	207-08-9	1.6
chrysene	218-01-9	16
dibenzo(a,h)anthracene	53-70-3	0.016
indeno(1,2,3-cd)pyrene	193-39-5	0.16

Previous to revision, the Water Supply standard for BaP adopted by the commission was a hybrid standard that ranged from the concentration protective of human-health to the drinking water maximum contaminant level (MCL). The hybrid standard approach was adopted in the 2004 rulemaking in response to ongoing debate dating back to 1989 about whether standards for parameters with MCLs should be based on the MCLs or purely health-based numbers. The arguments for MCLs focused on whether it is reasonable to require groundwater remediation to a level below that required for drinking water. The arguments for health-based standards focused on maximizing human-health protection, putting the clean-up burden on pollution sources, and protection of groundwater as a resource. In response, the commission adopted a hybrid standard approach that provided much of the benefits advocated for each of the above options. This hybrid approach had the intention to allow for existing contamination to be addressed at levels that are deemed acceptable according to the Safe Drinking Water Act, but allowed for the protection of groundwater as a resource by implementing a more protective human-health health based standard for future contamination.

There are more appropriate alternative regulatory pathways, such as variances, through which dischargers can seek regulatory relief. Furthermore, recent litigation in Idaho has resulted from attempts to adopt water quality standards that are not fully protective of the beneficial uses. In May 2016, EPA entered into a consent decree with Northwest Environmental Advocates to reconsider EPA's 2010 approval of Idaho's human health criteria for arsenic, which were based on the MCL in drinking water. In September 2016, EPA disapproved Idaho's MCL-based criteria, citing that the criteria "are not protective of Idaho's designated uses, including primary and secondary contact recreation and domestic water supply". EPA also noted that there are significant differences between the allowable factors for developing MCLs and water quality criteria to protect designated uses under CWA section 303(c). EPA points out that MCLs are in some cases based on feasibility considerations, including the availability of technology to achieve the regulatory level and the cost of such treatment. In other cases, MCLs are based on concentrations that can be measured reliably rather than concentrations expected to be protective of human health. In contrast, water quality standards must be based on a sound scientific rationale and protect the designated use, rather than being based on available treatment technology, costs, or other feasibility considerations. In addition, water quality standards regulations at 40 CFR 131.11 (a)(1) are explicit that states must adopt water quality criteria that protect designated uses.

For BaP, the Colorado Hazardous Materials and Waste Management Division (at the time of rulemaking) uses the risk-based water quality standard to derive the groundwater protection level for BaP. Furthermore, the MCL for BaP is 0.2 µg/L; the incremental lifetime cancer risk factor

resulting from this concentration would be 1.21×10^{-5} , which is more than an order of magnitude greater than the risk factor that has been considered to be the appropriate level risk by the commission in past determinations (1×10^{-6}). Therefore, the commission adopted a risk-based Water Supply standard for BaP of 0.016 µg/L that is protective of human-health.

II. Changes to Division Provisions for Determining Point of Compliance at 41.6(D)

The commission adopted changes to the existing language in Regulation 41.6(D), which provides specific direction to the division when it determines points of compliance for groundwater permits. The commission revised the language to clarify that Regulation 41.6(D) applies to points of compliance in both Regulation No. 42 specified areas and unclassified areas governed by the interim narrative standard, consistent with the existing direction in Regulation 41.6(A) that Regulation 41.6(D) should apply to all activities regulated by the division.

The commission also removed the previous distinction in Regulation 41.6(D) between points of compliance for “new” and “existing” activities. Instead, the commission adopted one set of criteria for the division to use going forward in its adoption of points of compliance for all activities. These criteria are intended to allow for consideration and balance of a number of important factors, including but not limited to the use of land treatment technologies and/or groundwater dilution to achieve compliance with applicable standards, while ensuring that domestic water supplies and other uses are afforded the highest degree of protection that is technologically and economically feasible.

III. Alignment of Fractions Used for Standards for Inorganics in Regulation No. 41 with the Basis for the Standards

There are several standards for inorganic parameters in Tables 1, 2 and 3 of Regulation No. 41 that are currently expressed using the dissolved fraction. The division originally proposed to change the fraction for the majority of these parameters from the dissolved fraction to the total recoverable fraction (TREC). The division proposed these changes to accurately reflect the fraction of each inorganic parameter upon which the standards were developed to protect Water Supply or Agriculture uses, and also to better align with the use of the TREC fraction expression for these parameters in Regulation No. 31. The division also proposed to include a modified footnote “d” to Tables 1, 2, and 3 at 41.8, stipulating that the dissolved fraction for these parameters could still be considered for regulatory implementation purposes, as appropriate.

The division retracted these proposals based on concerns related to potential differences between measured concentrations of inorganics on a TREC or dissolved basis, especially in monitoring wells, possible misalignment with historically collected data and resulting impacts to ongoing monitoring programs, and a lack of information about the practicality, cost, or other impacts of evaluating the difference between dissolved and TREC concentrations for a particular parameter, at a particular site.

Existing Footnote “d” to Tables 1, 2, and 3 in Regulation No. 41 states that, while the standards are measured in dissolved concentrations, the ~~total TREC~~ concentration may be considered on a case-by-case basis. The commission added the phrase “for the protection of groundwater uses” to the existing Footnote d to clarify that any case-by-case determinations requiring measurement of samples as the TREC concentration (as opposed to dissolved) are intended to serve the regulation’s stated purpose, that is, to protect existing and potential beneficial uses of groundwater. The commission does not intend for this clarifying language to result in changes to the scope of implementation of the footnote, but rather to clarify the underlying use protection purpose when the division and implementing agencies make such case-by-case determinations going forward.

~~The commission adopted an addition to the footnote to clarify that the TREC fraction should be considered as an alternative to the dissolved fraction when needed to protect groundwater uses. For example, the TREC fraction should be considered as an alternative to the dissolved fraction at sites where hydrogeological conditions exist such that the dissolved fraction does not accurately represent groundwater quality within the aquifer and the source of groundwater pollution is in the close proximity~~

~~hydraulically connected to (and has the potential to impact) to water domestic/agricultural wells or areas where potential future drinking water domestic/agricultural wells could be established in close proximity downgradient. Additionally, certain site conditions can affect groundwater chemistry and the fraction (dissolved or TREC) of a pollutant migrating in groundwater.~~ Furthermore, measurement of the TREC fraction is more appropriate than the dissolved fraction when ~~directly~~ assessing ~~protection of the beneficial uses and~~ risks from direct exposures to potentially contaminated groundwater (e.g., when assessing any potential adverse effects from ingestion of groundwater from a private drinking well).

At this time, the commission ~~is not aware of~~ did not receive any information that would suggest that the use of the dissolved fraction of inorganics, as currently stipulated in Regulation No. 41 Tables 1-3, presents a widespread risk to groundwater uses. Additionally, use of the TREC fraction on a case-by-case basis, as stipulated in footnote "d" to Regulation No. 41 Tables 1-3, if appropriately implemented, should provide adequate protection to groundwater uses where consideration of only the dissolved fraction would not. Dissolved concentration remains the default method of measurement.

IV. Change of Ground Water to Groundwater

The commission adopted a change from "ground water" to "groundwater" throughout the regulation. This change is consistent with common technical usage and usage in the Water Quality Control Act. This change is part of a broad initiative to change the spelling program-wide and to increase consistency.

V. House Keeping

The commission added clarification to a number of items and corrected minor typographical errors:

- Alignment of footnote assignments for the following organic chemical standards between Regulation Nos. 31 and 41: biphenyl; carbofuran; 1,2 dibromo-3-chloropropane (DBCP); dibromoethane 1,2; dichloromethane (methylene chloride); dioxane 1,4; hexachloroethane; tetrachloroethane 1,1,2,2; tetrachloroethylene (PCE); and trihalomethanes
- Corrected the spelling of chlorpyrifos
- Corrected the spelling of trichloroacetic acid
- Corrected the spelling of chloronaphthalene
- Changed the order of appearance for a number of organic chemicals in Table A, to better align with Regulation No. 31 and display the correct alphabetical order: dichlorobenzidine, endosulfan sulfate, nitrosodiphenylamine N, and trichloroacetic acid
- Superscripted footnotes in Tables 2 and 3
- Added a synonym reference for chlorodibromomethane and dibromochloromethane to better align in Regulations 31 and 41.