

Chaffee Co.

18† | Chaffee Buena Vista Buena Vista Hot Springs 6 mi. W. of Buena Vista on Cottonwood Creek.

264

MINERAL WATERS OF COLORADO

NUMBER 18

COTTONWOOD SPRINGS

Location—6 miles west of Buena Vista.

Rate of Flow—100 to 150 gal. per min. Temperature—120° to 144° F.

Class of Water—Sodic, potassic, sulphated, carbonated, alkaline-saline.

Constituents	Formula	Milligrams per liter Approximately parts per million	Reacting value percentage
Silica	SiO ₂	61.2	2.37
Sulphate	SO ₄	108.03	23.21
Bicarbonate	HCO ₃	79.24	13.40
Carbonate	CO ₃	8.21	2.78
Phosphate	PO ₄	None	.....
Chloride	Cl	28.36	8.24
Iron	Fe	.....	.....
Aluminum	Al	.....	.....
Iron oxide	Fe ₂ O ₃	} None	.....
Aluminum oxide	Al ₂ O ₃		
Manganese	Mn	None	.....
Calcium	Ca	4.65	2.37
Magnesium	Mg	2.73	2.27
Potassium	K	34.2	9.07
Sodium	Na	81.0	36.29
Lithium	Li	Trace	.....
Oxygen to form SiO ₂		1.86	.....
Total		409.48	100.00

Concentration value	9.70	Excess carbon dioxide	28.57
Hydrogen sulphide, H ₂ S	None	Iron precipitated .....	.....
Arsenic, As .....	.....	Evaporation solids	382
Strontium, Sr .....	.....	Oxygen consuming capacity	None

Hypothetical Combinations

Milligrams per liter, approximately parts per million

Lith. chlor., LiCl	Trace	Iron and alum. oxides, Fe ₂ O ₃ , Al ₂ O ₃ .....	.....
Pot. chlor., KCl	59.63	Calc. silicate, CaSiO ₃	13.5
Sod. chlor., NaCl .....	.....	Silica, SiO ₂	54.2
Sod. sulph., Na ₂ SO ₄	154.5	Mang. oxide, Mn ₂ O ₄ .....	.....
Mag. sulph., MgSO ₄ .....	.....	Mag. bicarb., Mg(HCO ₃) ₂	16.43
Calc. sulph., CaSO ₄ .....	.....	Sod. bicarb., NaHCO ₃	90.25
Calc. carb., CaCO ₃ .....	.....	Pot. sulph., K ₂ SO ₄	6.53
Ferrous bicarb., Fe(HCO ₃) ₂ .....	.....	Sod. carb., Na ₂ CO ₃	14.51
Calc. bicarb., Ca(HCO ₃) ₂ .....	.....	
Total			409.55

Properties of Reaction in Per Cent

Primary salinity	62.90	Primary alkalinity	27.82
Secondary salinity .....	.....	Secondary alkalinity	9.28
Tertiary salinity .....	.....	Tertiary alkalinity .....	.....

14. Cottonwood Hot Springs (Buena Vista Hot Springs), Chaffee County. These springs are located along State Highway 306, six miles west of Buena Vista on Cottonwood Creek. The springs are near the contact of the Precambrian granite and the Tertiary monzonite intrusive of the Collegiate Range. The discharge of the springs has been estimated to be between 100 gpm and 150 gpm. with the temperature varying between 49°C and 62°C. The water was used in 1966 (Lewis, p. 60) for bathing at a new resort built in the area.

Pearl
1972

Location—
Rate of F
Class of V
saline
Constituent
Silica ..
Sulphate
Bicarbona
Carbonate
Phosphate
Chloride
Iron ..
Aluminum
Iron oxid
Aluminum
Manganes
Calcium
Magnesium
Potassium
Sodium
Lithium
Concentrat
Hydrogen
Arsenic, A
Strontium,
Lith. chlor.
Pot. chlor.
Sod. chlor.
Sod. sulph.
Mag. sulph.
Calc. sulph.
Calc. carb.
Ferrous bic
Calc. bicarb
Total

Chaffee

142† | Chaffee | Mt. Princeton | Hortense Hot Spring | About 250 yds. up side of mountain above Mt. Princeton Sta.

MINERAL WATERS OF COLORADO

373

NUMBER 142

HORTENSE SPRING

Location—Mt. Princeton.

Rate of Flow—22 to 33 gal. per min.

Temperature—183° F.

Class of Water—Sodic, sulphated, alkaline-saline, (siliceous).

Temperature—73° F.
e, (carbondioxated).

Reacting value percentage
7.58
38.29
4.13
6.66
3.83
5.13
34.38
100.00

Constituents	Formula	Milligrams per liter Approximately parts per million	Reacting value percentage
Silica	SiO ₂	76.1	.....
Sulphate	SO ₄	103.3	24.72
Bicarbonate	HCO ₃	104.2	19.65
Carbonate	CO ₃	Trace	.....
Phosphate	PO ₄	Trace	.....
Chloride	Cl	17.68	5.63
Iron	Fe	.....	.....
Aluminum	Al	.....	.....
Iron oxide	Fe ₂ O ₃	None	.....
Aluminum oxide	Al ₂ O ₃		
Manganese	Mn	None	.....
Calcium	Ca	4.37	2.53
Magnesium	Mg	Trace	.....
Potassium	K	1.5	.46
Sodium	Na	94.2	47.01
Lithium	Li	Trace	.....
Total		401.35	100.00

Excess carbon dioxide..... 616.7
Iron precipitated 3.05
Evaporation solids 1981
Oxygen consuming capacity 2.43

Concentration value	8.70	Excess carbon dioxide	37.58
Hydrogen sulphide, H ₂ S	None	Iron precipitated	None
Arsenic, As	.....	Evaporation solids	357
Strontium, Sr	.....	Oxygen consuming capacity	1.85

per million	
Ca(HCO ₃) ₂	395.5
Aluminum oxides	.....
CaSiO ₃	20.7
Mn ₂ O ₃	.....
Mg(HCO ₃) ₂	204.0
NaHCO ₃	1710.8
K ₂ SO ₄	58.8
Total	2964.5

Hypothetical Combinations

Milligrams per liter, approximately parts per million			
Lith. chlor., LiCl	Trace	Calc. bicarb., Ca(HCO ₃) ₂	17.67
Pot. chlor., KCl	3.25	Iron and aluminum oxides, Fe ₂ O ₃ , Al ₂ O ₃	.....
Sod. chlor., NaCl	26.61	Calc. silicate, CaSiO ₃	.....
Sod. sulph., Na ₂ SO ₄	152.8	Silica, SiO ₂	76.1
Mag. sulph., MgSO ₄	.....	Mang. oxide, Mn ₂ O ₃	.....
Calc. sulph., CaSO ₄	.....	Mag. bicarb., Mg(HCO ₃) ₂	Trace
Calc. carb., CaCO ₃	Trace	Sod. bicarb., NaHCO ₃	125.2
Ferrous bicarb., Fe(HCO ₃) ₂	.....	
Total			401.62

Salinity	55.60
Alkalinity	20.98
.....

Properties of Reaction in Percent

Primary salinity	60.70	Primary alkalinity	34.24
Secondary salinity	.....	Secondary alkalinity	5.06
Tertiary salinity	.....	Tertiary alkalinity	.....

Radioactivity

Temperature, °C, 83.8. Temperature, °F, 183.0.
Curies Ra Emanation per liter x 10⁻¹⁰, Gas, 656.0.
Mache Units per liter, Gas, 177.15.
Permanent Activity, Grams Ra per liter, x 10⁻¹⁰, None.

MINERAL WATERS OF COLORADO

NUMBER 143

HEYWOOD SPRING

Location—Bath House Spring, Mt. Princeton.
Rate of Flow—

Temperature—100° to 120° F.

Class of Water—Sodic, sulphated, bicarbonated, alkaline-saline (siliceous).

Constituents	Formula	Milligrams per liter Approximately parts per million	Reacting value percentage
Silica	SiO ₂	52.0	.....
Sulphate	SO ₄	51.24	19.04
Bicarbonate	HCO ₃	85.8	25.09
Carbonate	CO ₃	None	.....
Phosphate	PO ₄	None	.....
Chloride	Cl	11.78	5.87
Iron	Fe	.....	.....
Aluminum	Al	.....	.....
Iron oxide	Fe ₂ O ₃	None	.....
Aluminum oxide	Al ₂ O ₃		
Manganese	Mn	None	.....
Calcium	Ca	8.96	8.01
Magnesium	Mg	Trace	.....
Potassium	K	5.5	2.49
Sodium	Na	51.0	39.50
Lithium	Li	None	.....
Total		266.28	100.00

Concentration value	5.62	Excess carbon dioxide.....	30.96
Hydrogen sulphide, H ₂ S.....	None	Iron precipitated	None
Arsenic, As .....	.....	Evaporation solids	225
Strontium, Sr .....	.....	Oxygen consuming capacity	0.7

Hypothetical Combinations

Milligrams per liter, approximately parts per million		
Lith. chlor., LiCl.....	.....	Calc. bicarb., Ca(HCO ₃) ₂ ... 36.22
Pot. chlor., KCl.....	10.49	Iron and aluminum oxides, Fe ₂ O ₃ , Al ₂ O ₃
Sod. chlor., NaCl.....	11.19	Calc. silicate, CaSiO ₃
Sod. sulph., Na ₂ SO ₄	75.77	Silica, SiO ₂
Mag. sulph., MgSO ₄.....	.....	Mang. oxide, Mn ₂ O ₃
Calc. sulph., CaSO ₄.....	.....	Mag. bicarb., Mg(HCO ₃) ₂ ... Trace
Calc. carb., CaCO ₃.....	.....	Sod. bicarb., NaHCO ₃ 80.61
Ferrous bicarb., Fe(HCO ₃) ₂ .....	.....
Total		266.28

Properties of Reaction in Percent

Primary salinity	49.82	Primary alkalinity	34.16
Secondary salinity .....	.....	Secondary alkalinity	16.02
Tertiary salinity .....	.....	Tertiary alkalinity .....	.....

Location—At lower end
Rate of Flow—250 to 300
Class of Water—Sodic,
(siliceous).

Constituents

Silica
Sulphate
Bicarbonate
Carbonate
Phosphate
Chloride
Iron
Aluminum
Iron oxide
Aluminum oxide
Manganese
Calcium
Magnesium
Potassium
Sodium
Lithium

Concentration value ..
Hydrogen sulphide, H₂S ..
Arsenic, As

Milligrams per

Lith. chlor., LiCl.....
Pot. chlor., KCl.....
Sod. chlor., NaCl.....
Sod. sulph., Na ₂ SO ₄ ...
Mag. sulph., MgSO ₄ ...
Calc. sulph., CaSO ₄ ...
Calc. carb., CaCO ₃ ...
Ferrous bicarb., Fe(HCO ₃) ₂

Total

Primary salinity ...
Secondary salinity ...
Tertiary salinity ...

Temperature—°C
Curies Ra Eman
Mache Units per

Chaffee Co

144† | Chaffee | Mt. Princeton | Big Flat Spring | Big spring at lower end of flat between hotel and bath house.

MINERAL WATERS OF COLORADO

375

NUMBER 144

BIG SPRING

Location—At lower end of flat, Mt. Princeton.

Rate of Flow—250 to 300 gal. per min. Temperature—126° to 130° F.

Class of Water—Sodic, potassic, bicarbonated, sulphated, alkaline-saline, (siliceous).

—100° to 120° F.
saline (siliceous).

Reacting value percentage
.....
19.04
25.09
.....
5.87
.....
.....
8.01
.....
2.49
39.50
.....
100.00

Constituents	Formula	Milligrams per liter Approximately parts per million	Reacting value percentage
Silica	SiO ₂	60.5	.....
Sulphate	SO ₄	61.94	21.29
Bicarbonate	HCO ₃	85.8	23.26
Carbonate	CO ₃	Trace	.....
Phosphate	PO ₄	None	.....
Chloride	Cl	11.78	5.45
Iron	Fe	.....	.....
Aluminum	Al	.....	.....
Iron oxide	Fe ₂ O ₃	} None	.....
Aluminum oxide	Al ₂ O ₃		
Manganese	Mn	None	.....
Calcium	Ca	10.74	8.91
Magnesium	Mg	Trace	.....
Potassium	K	32.0	13.52
Sodium	Na	38.5	27.57
Lithium	Li	Trace	.....
Total		301.26	100.00

oxide..... 30.96
..... None
..... 225
g capacity 0.7

Concentration value	6.06	Excess carbon dioxide.....	30.96
Hydrogen sulphide, H ₂ S....	None	Iron precipitated	None
Arsenic, As .....	.....	Evaporated solids	270
Strontium, Sr .....	.....	Oxygen consuming capacity	0.7

Hypothetical Combinations

Milligrams per liter, approximately parts per million

..... million	.....
HCO ₃) ₂ ... 36.22	.....
m oxides, .....	.....
.....
SiO ₃.....	.....
..... 52.0	.....
.....
HCO ₃) ₂ ... Trace	.....
ICO ₃ 80.61	.....
..... 266.28	.....

Lith. chlor., LiCl.....	Trace	Calc. bicarb., Ca(HCO ₃) ₂ ...	43.44
Pot. chlor., KCl.....	24.77	Iron and aluminum oxides,	.....
Sod. chlor., NaCl.....	.....	Fe ₂ O ₃ , Al ₂ O ₃ .....	.....
Sod. sulph., Na ₂ SO ₄	57.08	Calc. silicate, CaSiO ₃.....	.....
Mag. sulph., MgSO ₄.....	.....	Silica, SiO ₂	60.5
Calc. sulph., CaSO ₄.....	.....	Mang. oxide, Mn ₂ O ₄.....	.....
Calc. carb., CaCO ₃	Trace	Mag. bicarb., Mg(HCO ₃) ₂ ...	Trace
Ferrous bicarb., Fe(HCO ₃) ₂ .....	.....	Sod. bicarb., NaHCO ₃	73.12
		Pot. sulph., K ₂ SO ₄	42.34
Total			301.25

Properties of Reaction in Percent

..... 34.16
ity 16.02
.....

Primary salinity	53.48	Primary alkalinity	28.70
Secondary salinity .....	.....	Secondary alkalinity	17.82
Tertiary salinity .....	.....	Tertiary alkalinity .....	.....

Radioactivity

Temperature—°C, 46.0. Temperature, °F, 114.8.
Curies Ra Emanation per liter x 10⁻¹⁰, Water, 9.41.
Mache Units per liter, Water, 2.54.

376

MINERAL WATERS OF COLORADO

NUMBER 145

SPRING NEAR HEYWOOD HOTEL

Location—Mt. Princeton.

Rate of Flow—40 gal. per min.

Temperature—137° to 141° F.

Class of Water—Sodic, potassic, bicarbonated, sulphated, alkaline-saline, (siliceous).

Constituents	Formula	Milligrams per liter Approximately parts per million	Reacting value percentage
Silica	SiO ₂	67.2	.....
Sulphate	SO ₄	58.75	21.20
Bicarbonate	HCO ₃	81.1	23.07
Carbonate	CO ₃	Trace	.....
Phosphate	PO ₄	None	.....
Chloride	Cl	11.78	5.73
Iron	Fe	.....	.....
Aluminum	Al	.....	.....
Iron oxide	Fe ₂ O ₃	None	.....
Aluminum oxide	Al ₂ O ₃		
Manganese	Mn	None	.....
Calcium	Ca	7.11	6.24
Magnesium	Mg	Trace	.....
Potassium	K	23.2	10.42
Sodium	Na	44.2	33.34
Lithium	Li	Trace	.....
Total.....		293.34	100.00

Concentration value	5.76	Excess carbon dioxide.....	29.24
Hydrogen sulphide, H ₂ S....	None	Iron precipitated	None
Arsenic, As .....	.....	Evaporation solids	265.0
Strontium, Sr .....	.....	Oxygen consuming capacity	0.7

Hypothetical Combinations

Milligrams per liter, approximately parts per million

Lith. chlor., LiCl.....	Trace	Calc. bicarb., Ca(HCO ₃) ₂ ...	28.74
Pot. chlor., KCl.....	24.77	Iron and aluminum oxides, Fe ₂ O ₃ , Al ₂ O ₃ .....	.....
Sod. chlor., NaCl.....	.....	Calc. silicate, CaSiO ₃.....	.....
Sod. sulph., Na ₂ SO ₄	67.26	Silica, SiO ₂	67.2
Mag. sulph., MgSO ₄.....	.....	Mang. oxide, Mn ₂ O ₃.....	.....
Calc. sulph., CaSO ₄.....	.....	Mag. bicarb., Mg(HCO ₃) ₂ ...	Trace
Calc. carb., CaCO ₃.....	.....	Sod. bicarb., NaHCO ₃	81.89
Ferrous bicarb., Fe(HCO ₃) ₂	.....	Pot. sulph., K ₂ SO ₄	23.52
Total			293.38

Properties of Reaction in Percent

Primary salinity	53.86	Primary alkalinity	33.66
Secondary salinity .....	.....	Secondary alkalinity	12.48
Tertiary salinity .....	.....	Tertiary alkalinity .....	.....

Radioactivity

Curies Ra Emanation per liter x 10⁻¹⁰, Gas, 202.2.
Mache Units per liter, Gas, 54.6.
Permanent Activity, Grams Ra per liter, x 10⁻¹⁰, None.

Location—1 mi.
Rate of Flow—1
Class of Water—
water.

Constituents
Silica
Sulphate
Bicarbonate
Carbonate
Phosphate
Chloride
Iron
Aluminum
Iron oxide
Aluminum oxide
Manganese
Calcium
Magnesium
Potassium
Sodium
Lithium

Concentration v
Hydrogen sulph
Arsenic, As ...
Strontium, Sr .

Milligr

Lith. chlor., LiCl
Pot. chlor., KCl
Sod. chlor., NaCl
Sod. sulph., Na ₂ SO ₄
Mag. sulph., MgSO ₄
Calc. sulph., CaSO ₄
Calc. carb., CaCO ₃
Ferrous bicarb., Fe(HCO ₃) ₂

Total

Primary salinity
Secondary salini
Tertiary salinity

Temperature
Curies Ra E
Mache Units
Permanent