

Sellars Gulch in Castle Rock, Colorado: May 24, 2022 Group 4:

Jacob Alvarado, Kyleigh Harrell, Emma Nelson, Lucas North, Emilee Sloan, Tierra Tisby



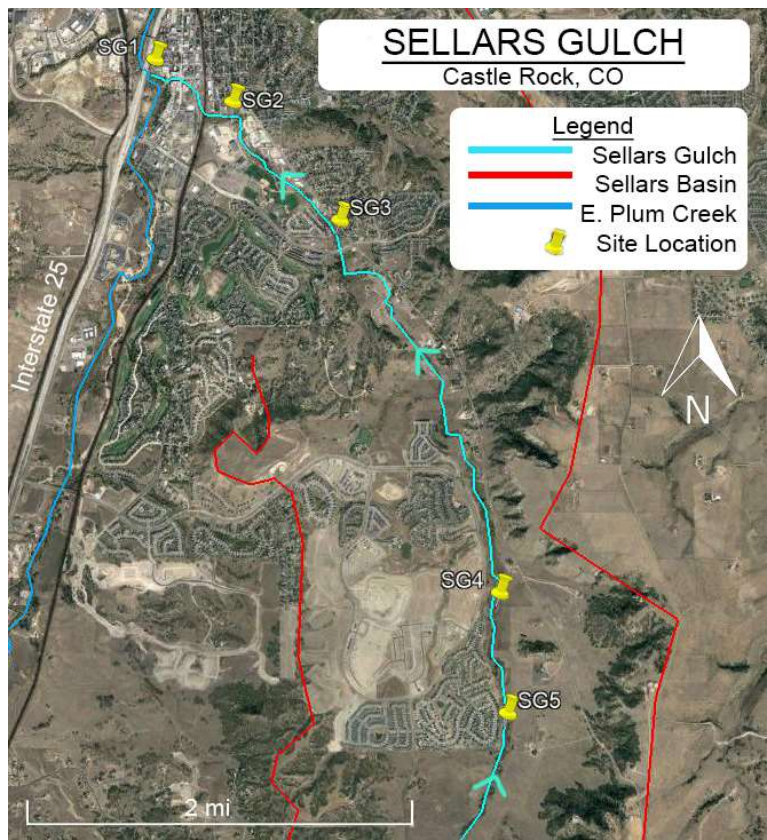
Table 1: Overview of constituents in Sellars Gulch

Regulation:			Primary Concerns [mg/L]				Biometrics [MPN/100ml]		Organics [mg/L]			Anions [mg/L]			Other Metals [mg/L]			
Regulation:			As	Se	P	Cl ⁻	Colif.	<i>E.coli</i>	COD	NPOC	TN	NO ₃ ⁻	SO ₄ ²⁻	S ⁻	Ca	Mn	Fe	Zn
EPA Aq. Life Chr. [1]			0.150	N/A	N/A	230	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.002	N/A	N/A	1.0	0.12
EPA Aq. Life Acu. [1]			0.34	N/A	N/A	860	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12
EPA Rec. & Fish [2]			1.8E-5	0.17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10***	N/A	N/A	N/A	0.05	N/A	7.4
EPA DW [3]			0.0100	0.05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11***	N/A	N/A	N/A	N/A	0.015	N/A
EPA 2nd DW. [4]			N/A	N/A	N/A	250	N/A	N/A	N/A	N/A	N/A	N/A	250	N/A	N/A	0.05	0.3	5
CDPHE Chronic [5]			2E-5	0.0046	0.11	250	200	126	N/A	N/A	N/A	N/A	WS	N/A	N/A	1.430	WS	0.0082
CDPHE Acute [5]			0.340	0.0184	N/A	N/A	200	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	2.590	N/A	0.110
USDA Livestock [6]			0.01	0.05	N/A	1500	200	N/A	N/A	N/A	N/A	100***	1000	N/A	500	0.05	0.3	25
Detection Limit			0.0168	0.0110	0.029	0.1	1	1	3.0	0.10	0.10	0.1	0.1	0.034	0.0022	0.0001	0.0003	0.0003
w	Site	Date	As	Se	P	Cl ⁻	Colif.	<i>E.coli</i>	COD	NPOC	TN	NO ₃ ⁻	SO ₄ ²⁻	S	Ca	Mn	Fe	Zn
	SG1	05/17/22	BDL	BDL	0.031	234	866	548	20.2	6.00	3.23	14.3	70.4	22.3	98.1	0.054	0.012	0.011
	SG2	05/17/22	BDL	BDL	0.069	269	75.4	71.7	10.5	4.50	2.85	13.1	144	18.5	80.7	0.220	0.026	0.010
	SG3	05/17/22	0.017	BDL	0.138	150	2	BDL	15.3	6.42	0.43	0.482	187	36.5	115	0.118	0.207	0.033
	SG3*	05/17/22	BDL	BDL	0.122	370	67.5	6.2	49.9	19.1	1.55	1.99	145	22.4	87.0	0.097	0.019	0.009
	SG4	05/17/22	BDL	BDL	0.071	50.1	2.0	1.0	18.9	7.81	0.49	0.14	57.6	22.0	70.5	0.152	0.051	0.007
	SG5	05/17/22	BDL	0.015	BDL	60.2	14.8	BDL	25.5	11.2	1.62	5.42	128	45.9	104	0.243	0.038	0.010
	SG5*	05/17/22	BDL	BDL	0.194	33.4	N/A	N/A	42.3	16.6	7.21	26.2	55.6	21.5	53.7	0.017	0.054	0.022
	SG1	05/20/22	BDL	0.028	BDL	164	870	141	12.6	4.85	3.13	13.3	60.3	22.9	99.7	0.062	0.018	0.001
	SG3*	05/20/22	BDL	0.018	0.481	73.4	>241	180	263	89.2	8.3	4.26	38.5	18.8	27.1	0.044	0.104	0.012
	SG5*	05/20/22	BDL	0.016	0.192	10.9	99.5	42.5	93	24.4	2.71	5.91	22.0	9.46	24.3	0.006	0.034	BDL
s	Site	Date	As	Se	P	S	Ca	Mn	Fe	Zn	pH	EC	Alk.					
	SG1	05/17/22	BDL	BDL	0.683	15.7	34.8	0.023	0.061	0.010	7.74	603	56					
	SG2	05/17/22	BDL	BDL	0.155	25.6	36.3	0.002	0.051	0.008	7.7	1130	260					
	SG2*	05/17/22	BDL	BDL	0.979	1.87	3.21	0.008	0.942	0.020	7.79	147	70					
	SG3*	05/17/22	BDL	BDL	0.685	30.5	45.1	0.013	0.027	0.011	8.12	1350	45					
	SG4	05/17/22	BDL	BDL	0.600	0.700	3.05	0.006	0.041	0.004	6.65	50	35					
	SG1	05/17/22	BDL	0.043	1.24	4.53	82.5	1.65	0.139	0.183								
	SG2	05/17/22	BDL	0.035	0.463	4.26	70.8	1.19	0.120	0.157								
	SG2*	05/17/22	BDL	0.052	0.371	2.71	180	2.81	0.679	0.434								
	SG3*	05/17/22	BDL	0.053	0.826	11.5	253	3.02	0.888	0.662								
	SG4	05/17/22	BDL	0.029	0.776	0.706	36.5	0.470	0.043	0.025								

*Denotes sample taken at storm structure, ***Nitrate + Nitrite, Water (w), Soil (s), Colorado Division of Minerals and Geology (CDMG), Toxic Characteristic Leaching Procedure (TCLP), Chem. O₂ Demand (COD), Non-purgeable organic (NPOC), Total Nitrogen (TN), Drinking Water (DW), Most Probable Number (MPN)

- [1] O. US EPA, "National Recommended Water Quality Criteria - Aquatic Life Criteria Table," Sep. 03, 2015. <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table> (accessed May 24, 2022).
- [2] O. US EPA, "National Recommended Water Quality Criteria - Human Health Criteria Table," Sep. 28, 2015. <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table> (accessed May 24, 2022).
- [3] O. US EPA, "National Primary Drinking Water Regulations," Nov. 30, 2015. <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations> (accessed May 24, 2022)
- [4] O. US EPA, "Secondary Drinking Water Standards: Guidance for Nuisance Chemicals," Sep. 02, 2015. <https://www.epa.gov/sdwa/secondary-drinking-water-standards-guidance-nuisance-chemicals> (accessed May 24, 2022).
- [5] "Water Quality Control Commission regulations | Department of Public Health & Environment." <https://cdphe.colorado.gov/water-quality-control-commission-regulations> (accessed May 24, 2022).
- [6] G. Copenhaver, "United States Department of Agriculture," p. 31.

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Key Points	
•	Highest total coliform found at SG1.
•	Highest conductivity at SG2 due to beaver dams detaining water
•	Increased total coliform from day 1 to day 2 at SG3* at the stormwater drain.
•	10.2 pH at storm drain at SG5 during storm, likely due to new concrete washout
•	Zinc levels exceeding CDPHE Chronic standards
•	Phosphorus levels exceeding CDPHE Chronic standards
•	Iron (Fe) levels exceeded EPA drinking water standards at al
•	Sulfur is above EPA chronic levels for all sites

Recommendations	
•	Fix broken sewer line near SG1.
•	Inspect concrete washout areas at construction sites (high pH at SG5)
•	Inspect local culverts for corrosion

Table 2: General Site Information for first and second day (D1 & D2)

Site ID	Description	pH	EC (µS/cm)	Alk. (mg/L CaCO3)	T. Coliform (MPN/100ml)	TSS [mg/L]
SG1	Confluence @ E. Plum Creek. Leaking san. line.	D1: 8.01 D2: 7.58	D1: 1084 D2: 1112	D1: 138 D2: 142	D1: 866.4 D2: 841.1	0
SG2	Beaver dams, stagnant water.	6.88	1507	125.5	75.4	N/A
SG2*	Dry culvert from fairgrounds, soil leachate assessed	7.79	146.8	70	N/A	N/A
SG3	Residential development.	7.75	874	178	2.0	7.00
SG3*	Storm effluent from new pond	D1: 7.75 D2: 8.61	D1: 602 D2: 538	D1: N/A D2: 100	Day 1: 67.5 Day 2: 241.1	4.00
SG4	Near new subdivision	7.48	582	157.5	2	5.01
SG5	Near ranch.	7.42	735	171	14.8	33.8
SG5*	Inlet grate from subdivision	D1: 8.03 D2: 10.2	D1: 582 D2: 288	D1: 151 D2: 91.2	Day 1: N/A Day 2: 99.5	2.00

Table 1: Site Legend

Site ID	Location	Distance to Confluence [mi]
SG1	39°22'17"N 104°51'47.7"W E6173	0.01
SG2	39°22'5.08"N 104°51'18.37"W E6224	0.54
SG3A	39°21'30.62"N 104°50'38.30"W E6284	1.47
SG3B	39°21'28.09"N 104°50'36.96"W E6288	1.47
SG4	39°19'45.29"N 104°49'40.01"W E6445	3.89
SG5A	39°19'12.24"N 104°49'37.34"W E6494	3.89
SG5B	39°19'6.97"N 104°49'51.43"W E6534	4.17