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Table 1. COPCs (23) with toxicity values evaluated quantitatively

Compound	COPC endpoint	
	Cancer	Noncancer
1. Acetaldehyde	cancer	noncancer
2. Acetone		noncancer
3. Benzene	cancer	noncancer
4. 1,3-Butadiene	cancer	noncancer
5. Crotonaldehyde	cancer	NA
6. Cyclohexane		noncancer
7. Ethylbenzene	cancer	noncancer
8. Formaldehyde	cancer	noncancer
9. n-Hexane		noncancer
10. Isopropylbenzene		noncancer
11. Methylcyclohexane		noncancer
12. Nonane		noncancer
13. Pentane		noncancer
14. Propionaldehyde		noncancer
15. Propylene		noncancer
16. Propylbenzene		noncancer
17. Styrene		noncancer
18. Toluene		noncancer
19. 1,2,3-Trimethylbenzene		noncancer
20. 1,2,4-Trimethylbenzene		noncancer
21. 1,3,5-Trimethylbenzene		noncancer
22. m-Xylene/p-Xylene		noncancer
23. o-Xylene		noncancer

NA = not applicable because no toxicity value available

Table 2. Aliphatic (45) and Aromatic hydrocarbons (5) evaluated semi-quantitatively using EPA's fractional approach (surrogate toxicity method).

Aliphatic hydrocarbons C5-C8	Aliphatic hydrocarbons C9-C18	Aromatic Hydrocarbons C9-C16
1-Heptene	1-Decene	p-Diethylbenzene
1-Hexene	1-Dodecene	m-Diethylbenzene
1-Octene	1-Nonene	p-Ethyltoluene
1-Pentene	1-Tridecene	m-Ethyltoluene
2,2,3-Trimethylpentane	1-Undecene	o-Ethyltoluene
2,2,4-Trimethylpentane	a-Pinene	
2,2-Dimethylbutane	b-Pinene	
2,3,4-Trimethylpentane	n-Decane	
2,3-Dimethylbutane	n-Dodecane	
2,3-Dimethylpentane	n-Undecane	
2,4-Dimethylpentane	n-Tridecane	
2-Ethyl-1-butene		
2-Methyl-1-butene		
2-Methyl-1-pentene		
2-Methyl-2-butene		
2-Methylheptane		
2-Methylhexane		
2-Methylpentane		
3-Methyl-1-butene		
3-Methylheptane		
3-Methylhexane		
3-Methylpentane		
4-Methyl-1-pentene		
cis-2-Hexene		
cis-2-Pentene		
Cyclopentane		
Cyclopentene		
Isopentane		
Isoprene		
Methylcyclopentane		
n-Heptane		
n-Octane		
trans-2-Hexene		
trans-2-Pentene		

Table 3. COPCs (17) with no available toxicity values evaluated qualitatively.

Compounds
Acetylene
n-Butane
cis-2-Butene
trans-2-Butene
Ethane
Ethylene
Isobutane
Isobutene/1-Butene
Propane
Propyne
Carbonyls
Benzaldehyde
Butyraldehyde
2,5-Dimethylbenzaldehyde
Hexaldehyde
Isovaleraldehyde
Tolualdehydes
Valeraldehyde

Table 4. Comparison of the exposure point concentrations (EPCs) for chemicals with toxicity values at the rural Bell and Rulison/Battlement Mesa Monitoring Sites from 2008 to 2012

Compound	BELL Exposure Point Concentration ($\mu\text{g}/\text{m}^3$)					BROCK/RULISON/BATTELEMENT MESA Exposure Point Concentration ($\mu\text{g}/\text{m}^3$)				
	2008	2009	2010	2011	2012	Brock	Rulison		Battlement Mesa	
						2008	2009	2010	2011	2012
Acetaldehyde	0.943	0.893	1.033	0.715	0.712	0.889	1.472	1.330	0.884	0.643
Acetone	3.113	3.004	2.851	3.034	2.596	3.269	3.498	3.603	4.796	3.900
Benzene	1.521	1.977	1.256	0.978	0.743	0.964	2.711	1.781	1.855	1.187
1,3-Butadiene	0.053	0.048	0.071	0.074	0.126	0.053	0.047	0.088	0.097	0.130
Crotonaldehyde	0.155	0.280	0.296	0.063	0.236	0.253	0.272	0.215	0.157	0.085
Cyclohexane	5.010	3.270	3.569	2.339	2.031	2.413	4.896	3.667	2.460	1.973
Ethylbenzene	0.576	0.362	1.022	0.174	0.099	0.191	0.448	1.135	0.600	0.210
Formaldehyde	1.128	2.936	1.412	1.105	1.195	1.175	1.328	1.579	1.690	1.031
n-Hexane	7.319	8.073	6.612	4.110	3.805	4.606	7.853	5.498	4.154	3.213
Isopropylbenzene	0.090	0.073	0.088	0.083	0.069	0.084	0.072	0.085	0.098	0.076
Methylcyclohexane	6.812	7.749	6.198	4.262	3.594	4.855	10.59	7.478	4.990	3.969
Nonane	0.786	0.990	0.539	0.376	0.280	0.487	1.611	0.985	0.843	0.475
Pentane	17.39	14.45	11.56	9.280	7.096	8.222	17.41	10.82	8.500	8.128
Propionaldehyde	0.287	0.105	0.123	0.098	0.084	0.091	0.114	0.128	0.122	0.080
Propylene	0.101	0.489	0.523	0.411	0.427	0.295	0.567	0.555	0.456	0.492
Propylbenzene	0.374	0.106	0.105	0.091	0.097	0.074	0.124	0.144	0.220	0.120
Styrene	9.371	0.077	0.086	0.244	1.332	0.088	0.148	0.104	0.147	2.408
Toluene	0.097	3.728	2.232	1.816	1.582	2.226	5.643	3.657	3.656	5.207
1,2,3-Trimethylbenzene	0.098	0.123	0.094	0.101	0.065	0.070	0.128	0.091	0.219	0.101
1,2,4-Trimethylbenzene	0.304	0.516	0.301	0.245	0.314	0.211	0.475	0.397	0.723	0.401
1,3,5-Trimethylbenzene	0.185	0.193	0.175	0.132	0.097	0.159	0.388	0.331	0.287	0.171
m-Xylene/p-Xylene	1.608	1.978	1.151	0.645	0.566	1.179	3.452	1.939	1.611	1.153
o-Xylene	0.577	0.463	0.260	0.207	0.147	0.232	0.589	0.360	0.770	0.292
Aliphatic hydrocarbons C5-C8	71.50	64.36	49.559	34.67	27.007	31.84	62.141	49.87	38.41	24.507
Aliphatic hydrocarbons C9-C18	49.34	6.73	2.496	1.923	1.344	3.103	4.66	2.622	5.042	1.465
Aromatic hydrocarbons C9-C16	0.827	0.89	0.654	0.761	0.598	2.2	0.98	0.936	1.672	0.948

NA = Not Available

Table 5. Comparison of the exposure point concentrations (EPCs) for chemicals with toxicity values at the Parachute and Rifle Monitoring Site from 2008 to 2012

Compound	PARACHUTE Exposure Point Concentration ($\mu\text{g}/\text{m}^3$)					RIFLE Exposure Point Concentration ($\mu\text{g}/\text{m}^3$)				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Acetaldehyde	1.201	1.111	1.063	1.037	0.817	1.732	1.573	1.621	1.603	1.203
Acetone	3.709	3.681	2.934	3.315	2.643	3.988	3.490	3.427	3.207	2.984
Benzene	2.755	3.143	1.920	1.644	1.415	1.862	2.544	1.587	1.426	1.090
1,3-Butadiene	0.111	0.225	0.143	0.131	0.113	0.148	0.138	0.229	0.235	0.211
Crotonaldehyde	0.110	0.127	0.144	0.162	0.089	0.186	0.199	0.216	0.189	0.135
Cyclohexane	4.721	4.614	3.367	2.646	2.736	2.811	3.939	2.278	2.192	1.860
Ethylbenzene	0.726	0.518	3.458	0.367	0.184	0.526	0.623	2.720	0.384	0.288
Formaldehyde	1.865	1.912	1.696	1.835	1.404	2.124	1.853	1.955	2.102	1.574
n-Hexane	6.940	7.461	4.564	4.087	4.154	5.110	7.077	4.074	5.522	3.442
Isopropylbenzene	0.099	0.094	0.078	0.090	0.079	0.080	0.093	0.094	0.091	0.081
Methylcyclohexane	11.300	11.65	7.231	5.506	5.664	5.494	8.464	4.428	3.952	3.073
Nonane	2.727	2.452	1.254	1.196	0.678	0.916	1.505	0.675	0.502	0.345
Pentane	16.64	11.96	8.669	9.310	6.266	11.05	10.57	9.746	7.956	6.786
Propionaldehyde	0.765	0.112	0.150	0.111	0.081	0.973	0.188	0.190	0.179	0.126
Propylene	0.213	0.63	0.679	0.612	1.078	0.164	1.169	1.154	1.027	1.100
Propylbenzene	0.258	0.181	0.144	0.114	0.128	0.090	0.188	0.190	0.129	0.151
Styrene	11.830	n/a	0.165	0.248	2.522	4.890	0.100	0.100	0.135	1.016
Toluene	0.134	6.959	4.569	14.740	5.254	0.192	5.312	3.401	15.970	2.402
1,2,3-Trimethylbenzene	0.503	0.168	0.107	0.140	0.095	0.150	0.199	0.136	0.136	0.128
1,2,4-Trimethylbenzene	1.124	0.938	0.461	0.902	0.439	0.690	0.998	0.584	0.464	0.567
1,3,5-Trimethylbenzene	0.765	0.796	0.444	0.282	0.203	0.361	0.494	0.336	0.227	0.178
m-Xylene/p-Xylene	4.543	4.429	2.465	1.491	1.285	2.612	3.113	1.887	1.363	1.174
o-Xylene	0.911	0.778	0.490	0.473	0.292	0.709	0.864	0.565	0.485	0.399
Aliphatic hydrocarbons C5-C8	76.01	62.39	40.928	37.655	31.244	45.25	61.40	40.92	36.65	27.398
Aliphatic hydrocarbons C9-C18	70.14	8.41	3.350	2.714	1.986	3.671	4.54	2.703	2.446	1.782
Aromatic hydrocarbons C9-C16	2.094	1.46	0.988	0.988	1.150	1.203	1.570	1.057	1.116	1.268

Table 6. Comparison of the maximum concentrations for chemicals with toxicity values at the Bell and Rulison Monitoring Sites from 2008 to 2012

Compound	BELL Maximum Concentration ($\mu\text{g}/\text{m}^3$)					BROCK/RULISON/BATTLEMNT MESA Maximum Concentration ^a ($\mu\text{g}/\text{m}^3$)				
	2008	2009	2010	2011	2012	BROCK	RULISON		BATTLEMENT MESA	
							2008	2009	2010	2011
						2008	2009	2010	2011	2012
Acetaldehyde	1.964	1.398	1.777	0.742	1.629	1.591	2.757	2.595	1.308	1.414
Acetone	5.392	5.321	4.086	3.159	4.276	6.366	5.155	4.561	10.93	9.145
Benzene	13.631	4.537	4.201	2.636	1.502	2.401	6.283	2.923	6.869	2.364
1,3-Butadiene	0.053	0.153	0.372	0.149	0.267	0.053	0.177	0.18	0.16	0.448
Crotonaldehyde	0.467	0.553	0.467	0.0774	0.527	0.519	0.482	0.439	0.307	0.376
Cyclohexane	105.0	12.56	11.01	9.695	5.657	5.347	12.16	7.171	7.114	4.400
Ethylbenzene	4.337	1.183	8.142	0.36	0.388	0.482	1.997	4.961	1.851	0.409
Formaldehyde	2.237	10.21	2.468	1.159	3.107	2.102	1.744	2.947	2.616	1.805
n-Hexane	22.09	24.97	21.68	20.27	11.570	24.262	19.39	11.04	10.87	6.873
Isopropylbenzene	0.298	0.144	0.327	0.118	0.108	0.094	0.126	0.235	0.175	0.100
Methylcyclohexane	21.97	23.92	17.55	16.64	9.236	9.810	26.27	13.31	15.72	8.605
Nonane	2.501	3.077	1.766	1.037	0.688	1.463	3.456	1.795	3.258	0.973
Pentane	61.97	53.71	45.62	38.13	20.480	35.057	34.64	25.38	22.13	30.570
Propionaldehyde	0.204	0.19	0.247	0.135	0.173	0.183	0.214	0.333	0.2	0.154
Propylene	0.597	2.455	1.274	0.774	1.624	0.757	1.773	1.073	0.711	1.446
Propylbenzene	0.710	0.397	0.335	0.18	0.323	0.164	0.221	0.481	0.677	0.291
Styrene	3.445	0.215	0.296	2.694	10.920	0.431	0.405	0.353	0.396	13.150
Toluene	79.14	9.367	6.353	8.021	3.930	4.883	12.92	7.268	12.33	19.600
1,2,3-Trimethylbenzene	0.841	0.847	0.399	0.275	0.170	0.135	0.348	0.194	0.726	0.276
1,2,4-Trimethylbenzene	3.091	2.96	0.825	1.213	0.939	0.661	1.071	1.114	2.338	0.978
1,3,5-Trimethylbenzene	0.836	1.202	0.595	0.452	0.345	0.412	0.934	0.601	1.098	0.302
m-Xylene/p-Xylene	9.879	5.064	7.924	1.585	1.574	3.707	7.924	3.799	7.436	1.878
o-Xylene	3.610	1.693	0.912	0.57	0.462	0.522	2.003	0.689	2.421	0.477
Aliphatic hydrocarbons C5-C8	230.7	207.9	149.1	117.1	77.31	88.18	139.5	104.0	100.8	60.55
Aliphatic hydrocarbons C9-C18	406.2	46.93	9.751	6.861	4.699	10.44	17.40	6.330	14.55	4.064
Aromatic hydrocarbons C9-C16	4.688	4.72	2.348	2.288	2.304	10.66	2.34	3.243	5.543	2.347

NA = Not Available.

Table 7. Comparison of the maximum concentrations for chemicals with toxicity values at the Parachute and Rifle Monitoring Site from 2008 to 2012

Compound	PARACHUTE Maximum Concentration ($\mu\text{g}/\text{m}^3$)					RIFLE Maximum Concentration ($\mu\text{g}/\text{m}^3$)				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Acetaldehyde	1.838	2.036	1.946	1.515	1.559	2.901	2.757	2.378	2.342	2.360
Acetone	5.915	7.293	4.371	8.029	4.062	6.746	6.485	5.202	5.297	5.345
Benzene	11.076	10.12	4.015	3.69	2.960	4.079	6.656	3.743	2.785	3.056
1,3-Butadiene	0.033	3.147	0.658	0.33	0.281	0.486	0.402	0.979	0.533	0.570
Crotonaldehyde	0.238	0.258	0.381	0.33	0.330	0.436	0.433	0.439	0.396	0.407
Cyclohexane	13.080	18.76	8.605	9.236	6.597	7.401	9.925	7.573	6.138	5.909
Ethylbenzene	2.616	1.916	26.6	1.574	0.419	1.167	1.661	25.67	0.852	0.695
Formaldehyde	3.257	3.046	3.168	2.616	2.309	4.818	2.923	3.095	3.389	2.800
n-Hexane	18.799	28.90	12.1	14.45	10.050	15.920	16.8	13.39	39.89	11.160
Isopropylbenzene	0.250	0.317	0.165	0.147	0.139	0.120	0.176	0.375	0.134	0.116
Methylcyclohexane	35.283	48.99	19.79	18.99	13.250	14.343	24.44	14.17	10.67	10.330
Nonane	13.348	11.95	2.343	6.411	2.011	2.285	5.776	2.308	1.702	1.020
Pentane	150.50	41.08	21.42	42.37	17.410	34.703	29.92	25.85	22.25	20.600
Propionaldehyde	0.283	0.316	0.254	0.219	0.154	0.371	0.444	0.337	0.283	0.268
Propylene	1.417	1.509	1.492	1.222	3.769	2.782	2.444	3.224	1.819	2.547
Propylbenzene	1.092	0.688	0.303	0.222	0.413	0.326	0.527	0.967	0.285	0.546
Styrene	1.917	0.163	0.884	1.741	11.770	0.352	0.16	0.42	0.543	7.082
Toluene	118.44	24.76	17.12	93.13	15.990	15.020	15.18	7.591	93.67	6.137
1,2,3-Trimethylbenzene	3.485	0.623	0.392	0.44	0.277	0.358	0.579	0.27	0.27	0.552
1,2,4-Trimethylbenzene	7.374	3.234	0.819	5.571	1.360	1.595	2.775	1.431	0.901	2.125
1,3,5-Trimethylbenzene	5.347	2.862	0.792	0.505	0.511	0.803	1.535	0.934	0.494	0.469
m-Xylene/p-Xylene	11.833	19.70	5.808	4.7	3.539	5.916	10.75	4.597	3.457	3.343
o-Xylene	3.175	3.17	1.661	1.889	0.624	1.623	2.48	1.178	1.156	0.890
Aliphatic hydrocarbons C5-C8	260.9	218.7	116.93	136.28	75.127	113.4	179.7	119.26	108.55	85.466
Aliphatic hydrocarbons C9-C18	444.8	40.47	12.936	12.86	5.563	12.73	16.25	10.019	8.501	8.857
Aromatic hydrocarbons C9-C16	16.258	5.78	2.353	1.004	5.692	2.882	4.3	2.566	2.691	5.922

Table 8. Comparison of the Cumulative Estimated Cancer Risks (CR) and Noncancer Hazard Indices (HIs) Across Monitoring Sites from 2008 to 2012.

Time Period	Bell		Battlement Mesa		Ruilison		Parachute		Rifle	
	CR	HI	CR	HI	CR	HI	CR	HI	CR	HI
2008										
Total from all COPCs	3.51E-04	1.1	NA	NA	NA	NA	4.43E-04	1.8	1.78E-04	1.0
Total without Crotonaldehyde (Croton)	2.67E-04	NA	NA	NA	NA	NA	3.83E-04	NA	7.70E-05	NA
Total without Hydrocarbons & Croton	3.1E-05	0.50	NA	NA	NA	NA	5.30E-05	1.0	5.19E-05	0.90
<i>Only Hydrocarbons</i>	2.36E-04 (67%)	0.60 (55%)	NA	NA	NA	NA	3.30E-04 (74%)	0.8 (45%)	2.51E-05 (14%)	0.1 (10%)
2009										
Total from all COPCs	2.52E-04	0.9	NA	NA	2.25E-04	0.8	1.79E-04	1.1	1.93E-04	1.00
Total without Crotonaldehyde (Croton)	1.00E-04	NA	NA	NA	7.70E-05	NA	1.10E-04	NA	8.50E-05	NA
Total without Hydrocarbons & Croton	5.75E-05	0.70	NA	NA	4.42E-05	0.60	6.0E-05	0.90	5.30E-05	0.80
<i>Only Hydrocarbons</i>	4.23E-05 (17%)	0.2 (22%)	NA	NA	3.28E-05 (15%)	0.2 (25%)	5.0E-05 (28%)	0.20 (18%)	3.21E-05 (17%)	0.2 (20%)
2010										
Total from all COPCs	2.16E-04	0.6	NA	NA	1.81E-04	0.7	1.53E-04	0.7	1.92E-04	0.8
Total without Crotonaldehyde (Croton)	5.58E-05	NA	NA	NA	6.41E-05	NA	7.48E-05	NA	7.50E-05	NA
Total without Hydrocarbons & Croton	3.52E-05	0.50	NA	NA	4.27E-05	0.60	5.54E-05	0.60	5.50E-05	0.70
<i>Only Hydrocarbons</i>	2.06E-05 (10%)	0.10 (17%)	NA	NA	2.13E-05 (12%)	0.1 (14%)	2.29E-05 (15%)	0.1 (14%)	2.00E-05 (13%)	0.1 (12%)
2011										
Total from all COPCs	7.57E-05	0.5	1.58E-04	0.7	NA	NA	1.51E-04	0.7	1.71E-04	0.8
Total without Crotonaldehyde (Croton)	4.15E-05	NA	7.28E-05	NA	NA	NA	6.30E-05	NA	6.80E-05	NA
Total without Hydrocarbons & Croton	2.63E-05	0.40	4.27E-05	0.60	NA	NA	4.36E-05	0.60	5.00E-05	0.70
<i>Only Hydrocarbons</i>	1.52E-05 (20%)	0.1 (20%)	3.0E-05 (19%)	0.1 (14%)	NA	NA	1.94E-05 (13%)	0.10 (14%)	1.80E-05 (11%)	0.1 (12%)
2012										
Total from all COPCs	1.66E-04	0.5	8.59E-05	0.5	NA	NA	9.81E-05	0.6	1.25E-04	0.7
Total without Crotonaldehyde (Croton)	3.81E-05	NA	3.98E-05	NA	NA	NA	4.98E-05	NA	5.17E-05	NA
Total without Hydrocarbons & Croton	2.69E-05	0.40	2.84E-05	0.40	NA	NA	3.48E-05	0.50	3.85E-05	0.60
<i>Only Hydrocarbons</i>	1.12E-05 (7%)	0.1 (20%)	1.13E-05 (13%)	0.1 (20%)	NA	NA	1.5E-05 (15%)	0.1 (17%)	1.32E-05 (11%)	0.1 (14%)

Table 9. Percent Contribution of various air toxics to the Cumulative Estimated Cancer Risks (CR) and Noncancer Hazard Indices (HIs) Across the Bell, Parachute, and Rifle Monitoring Sites from 2008 to 2012.

Time Period	Bell		Parachute		Rifle	
	CR (%)	HI (%)	CR (%)	HI (%)	CR (%)	HI (%)
2008						
Total from all COPCs	3.51E-04	1.1	4.43E-04	1.8	1.78E-04	1.0
Carbonyls (without acetone)	1E-04 (29%)	0.3 (27%)	8.7E-05 (20%)	0.4 (22%)	1.32E-04 (74%)	0.5 (50%)
SNMOCs without Hydrocarbons	1.49E-05 (4%)	0.24 (18%)	2.67E-05 (6%)	0.6 (33%)	2.0E-05 (12%)	0.4 (40%)
<i>Hydrocarbons</i> <i>Aliphatic (C3-C18) and Aromatic (C9-C16)</i>	2.36E-04(67%)	0.60(55%)	3.30E-04(74%)	0.8(45%)	2.51E-05(14%)	0.1(10%)
2009						
Total from all COPCs	2.52E-04	0.9	1.79E-04	1.1	1.93E-04	1.00
Carbonyl (without acetone)	1.92E-04 (76%)	0.4 (45%)	9.63E-05 (54%)	0.3 (27%)	1.35E-04 (70%)	0.4 (40%)
SNMOCs without Hydrocarbons	1.77E-05 (7%)	0.3 (33%)	3.26E-05 (18%)	0.6 (55%)	2.55E-05 (13%)	0.4 (40%)
<i>Hydrocarbons</i> <i>Aliphatic (C5-C18) and Aromatic (C9-C16)</i>	4.25E-05 (17%)	0.2 (22%)	5.0E-05 (28%)	0.20 (18%)	3.21E-05 (17%)	0.2 (20%)
2010						
Total from all COPCs	2.16E-04	0.6	1.53E-04	0.7	1.92E-04	0.8
Carbonyls (without acetone)	1.82E-04 (84%)	0.3 (50%)	1.0E-04 (65%)	0.3 (43%)	1.46E-04 (76%)	0.4 (50%)
SNMOCs without Hydrocarbons	1.45E-05 (6%)	0.2 (33%)	2.8E-05 (20%)	0.3 (43%)	2.61E-05 (11%)	0.3 (38%)
<i>Hydrocarbons</i> <i>Aliphatic (C5-C18) and Aromatic (C9-C16)</i>	2.06E-05 (10%)	0.10(17%)	2.29E-05(15%)	0.1 (14%)	2.00E-05 (13%)	0.1 (12%)
2011						
Total from all COPCs	7.57E-05	0.5	1.51E-04	0.7	1.71E-04	0.8
Carbonyls (without acetone)	5.02E-05 (66%)	0.2 (40%)	1.14E-04 (75%)	0.3 (43%)	1.34E-04 (78%)	0.4 (50%)
SNMOCs without Hydrocarbons	1.03E-05 (14%)	0.2 (40%)	1.76E-05 (12%)	0.3 (43%)	1.91E-05 (11%)	0.3 (38%)
<i>Hydrocarbons</i> <i>Aliphatic (C5-C18) and Aromatic (C9-C16)</i>	1.52E-05(20%)	0.1(20%)	1.94E-05(13%)	0.10 (14%)	1.80E-05(11%)	0.1 (12%)
2012						
Total from all COPCs	1.66E-04	0.5	9.81E-05	0.6	1.25E-04	0.7
Carbonyls (without acetone)	1.45E-04 (87%)	0.2 (40%)	6.84E-05 (70%)	0.2 (33%)	1.34E-04(77%)	0.3 (43%)
SNMOCs without Hydrocarbons	9.82E-06 (6%)	0.2 (40%)	1.5E-05 (15%)	0.3 (50%)	1.55E-05 (12%)	0.3 (43%)
<i>Hydrocarbons</i> <i>Aliphatic (C5-C18) and Aromatic (C9-C16)</i>	1.12E-05(7%)	0.1(20%)	1.5E-05(15%)	0.1(17%)	1.32E-05(11%)	0.1 (14%)

Table 10. Comparison of the estimated cancer risks and noncancer hazard quotients (HQs) from 2008 to 2012 at the Bell Monitoring Site.

Compound	BELL Cancer Risk Estimates					BELL Non-Cancer Hazard Quotients (HQs)				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Acetaldehyde	2.07E-06	1.96E-06	2.27E-06	1.57E-06	1.57E-06	0.10	0.10	0.11	0.08	0.08
Acetone	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Benzene	1.19E-05	1.54E-05	9.80E-06	7.63E-06	5.80E-06	0.05	0.07	0.04	0.03	0.02
1,3-Butadiene	1.59E-06	1.44E-06	2.13E-06	2.22E-06	3.78E-06	0.03	0.02	0.04	0.04	0.06
Crotonaldehyde	8.42E-05	1.52E-04	1.61E-04	3.42E-05	1.28E-04	NA	NA	NA	NA	NA
Cyclohexane	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Ethylbenzene	1.44E-06	9.05E-07	2.56E-06	4.35E-07	2.48E-07	0.00	0.00	0.00	0.00	0.00
Formaldehyde	1.47E-05	3.82E-05	1.84E-05	1.44E-05	1.55E-05	0.12	0.30	0.14	0.11	0.12
n-Hexane	NC	NC	NC	NC	NC	0.01	0.01	0.01	0.01	0.01
Isopropylbenzene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Methylcyclohexane	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Nonane	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Pentane	NC	NC	NC	NC	NC	0.02	0.01	0.01	0.01	0.01
Propionaldehyde	NC	NC	NC	NC	NC	0.04	0.01	0.02	0.01	0.01
Propylene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Propylbenzene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Styrene	NC	NC	NC	NC	NC	0.01	0.00	0.00	0.00	0.00
Toluene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
1,2,3-Trimethylbenzene	NC	NC	NC	NC	NC	0.02	0.02	0.02	0.02	0.01
1,2,4-Trimethylbenzene	NC	NC	NC	NC	NC	0.04	0.07	0.04	0.04	0.04
1,3,5-Trimethylbenzene	NC	NC	NC	NC	NC	0.01	0.01	0.01	0.01	0.00
m-Xylene/p-Xylene	NC	NC	NC	NC	NC	0.02	0.02	0.01	0.01	0.01
o-Xylene	NC	NC	NC	NC	NC	0.01	0.00	0.00	0.00	0.00
Aliphatic hydrocarbons C5-C8	1.36E-05	1.22E-05	9.42E-06	6.59E-06	5.13E-06	0.12	0.11	0.08	0.06	0.05
Aliphatic hydrocarbons C9-C18	2.22E-04	3.03E-05	1.12E-05	8.65E-06	6.05E-06	0.49	0.07	0.02	0.02	0.01
Aromatic hydrocarbons C9-C16	NC	NC	NC	NC	NC	0.01	0.01	0.01	0.01	0.01
Cumulative Cancer Risk and Noncancer Hazard Index (HI)	3.51E-04 (1.15E-04)*	2.52E-04 (2.10E-04)*	2.16E-04 (1.95E-04)*	7.57E-05 (6.05E-05)*	1.66E-04 (3.80E-05)*	1.09 (0.5)*	0.85 (0.7)*	0.58 (0.5)*	0.45 (0.4)*	0.45 (0.4)*

NC = NonCarcinogen; NA = Not Available*The Estimated Cumulative Cancer Risk and noncancer hazards without hydrocarbons.

Table 11. Comparison of the estimated cancer risks and noncancer hazard quotients (HQs) from 2009 to 2012 at the Rulison and Battlement Mesa Monitoring Sites.

Compound	RULISON/Battlement Mesa Cancer Risk					RULISON/Battlement Mesa Non-Cancer Hazard Quotients (HQs)				
	2008	RULISON		Battlement Mesa		2008	RULISON		Battlement Mesa	
		2009	2010	2011	2012		2009	2010	2011	2012
Acetaldehyde	NA	3.24E-06	2.93E-06	1.94E-06	1.41E-06	NA	0.16	0.15	0.10	0.07
Acetone	NA	NC	NC	NC	NC	NA	0.00	0.00	0.00	0.00
Benzene	NA	2.11E-05	1.39E-05	1.45E-05	9.26E-06	NA	0.09	0.06	0.06	0.04
1,3-Butadiene	NA	1.41E-06	2.64E-06	2.91E-06	3.90E-06	NA	0.02	0.04	0.05	0.07
Crotonaldehyde	NA	1.48E-04	1.17E-04	8.53E-05	4.62E-05	NA	NA	NA	NA	NA
Cyclohexane	NA	NC	NC	NC	NC	NA	0.00	0.00	0.00	0.00
Ethylbenzene	NA	1.12E-06	2.84E-06	1.50E-06	5.25E-07	NA	0.00	0.00	0.00	0.00
Formaldehyde	NA	1.73E-05	2.05E-05	2.20E-05	1.34E-05	NA	0.14	0.16	0.17	0.11
n-Hexane	NA	NC	NC	NC	NC	NA	0.01	0.01	0.01	0.00
Isopropylbenzene	NA	NC	NC	NC	NC	NA	0.00	0.00	0.00	0.00
Methylcyclohexane	NA	NC	NC	NC	NC	NA	0.00	0.00	0.00	0.00
Nonane	NA	NC	NC	NC	NC	NA	0.01	0.00	0.00	0.00
Pentane	NA	NC	NC	NC	NC	NA	0.02	0.01	0.01	0.01
Propionaldehyde	NA	NC	NC	NC	NC	NA	0.01	0.02	0.02	0.01
Propylene	NA	NC	NC	NC	NC	NA	0.00	0.00	0.00	0.00
Propylbenzene	NA	NC	NC	NC	NC	NA	0.00	0.00	0.00	0.00
Styrene	NA	NC	NC	NC	NC	NA	0.00	0.00	0.00	0.00
Toluene	NA	NC	NC	NC	NC	NA	0.00	0.00	0.00	0.00
1,2,3-Trimethylbenzene	NA	NC	NC	NC	NC	NA	0.03	0.02	0.04	0.02
1,2,4-Trimethylbenzene	NA	NC	NC	NC	NC	NA	0.08	0.06	0.10	0.06
1,3,5-Trimethylbenzene	NA	NC	NC	NC	NC	NA	0.02	0.02	0.01	0.01
m-Xylene/p-Xylene	NA	NC	NC	NC	NC	NA	0.03	0.02	0.02	0.01
o-Xylene	NA	NC	NC	NC	NC	NA	0.01	0.00	0.01	0.00
Aliphatic hydrocarbons C5-C8	NA	1.18E-05	9.48E-06	7.30E-06	4.66E-06	NA	0.10	0.07	0.06	0.04
Aliphatic hydrocarbons C9-C18	NA	2.10E-05	1.18E-05	2.27E-05	6.59E-06	NA	0.05	0.03	0.05	0.01
Aromatic hydrocarbons C9-C16	NA	NC	NC	NC	NC	NA	0.01	0.01	0.02	0.01
Cumulative Cancer Risk and Noncancer Hazard Index (HI) for all Chemicals	NA	2.25E-04 (1.92E-04)*	1.81E-04 (1.60E-04)*	1.58E-04 (1.28E-04)*	8.59E-05 (7.46E-05)*	NA	0.78 (0.6)*	0.69 (0.6)*	0.74 (0.6)*	0.48 (0.4)*

NC = NonCarcinogen; NA = Not Available; In 2008, the Brock monitoring site was used (see Table A5).

*The Estimated Cumulative Cancer Risk and noncancer hazard estimates without hydrocarbons.

Table 12. Comparison of the Estimated Cancer Risks and Noncancer Hazard Quotients (HQs) from 2008 to 2012 at the Parachute Monitoring Site.

Compound	PARACHUTE Cancer Risk					PARACHUTE Non-Cancer Hazard Quotients (HQs)				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Acetaldehyde	2.64E-06	2.44E-06	2.34E-06	2.28E-06	1.80E-06	0.13	0.12	0.12	0.12	0.09
Acetone	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Benzene	2.15E-05	2.45E-05	1.50E-05	1.28E-05	1.10E-05	0.09	0.10	0.06	0.05	0.05
1,3-Butadiene	3.33E-06	6.75E-06	4.29E-06	3.93E-06	3.39E-06	0.06	0.11	0.07	0.07	0.06
Crotonaldehyde	5.97E-05	6.90E-05	7.82E-05	8.80E-05	4.83E-05	NA	NA	NA	NA	NA
Cyclohexane	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Ethylbenzene	1.82E-06	1.30E-06	8.65E-06	9.18E-07	4.60E-07	0.00	0.00	0.00	0.00	0.00
Formaldehyde	2.42E-05	2.49E-05	2.20E-05	2.39E-05	1.83E-05	0.19	0.20	0.17	0.19	0.14
n-Hexane	NC	NC	NC	NC	NC	0.01	0.01	0.01	0.01	0.01
Isopropylbenzene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Methylcyclohexane	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Nonane	NC	NC	NC	NC	NC	0.01	0.01	0.01	0.01	0.00
Pentane	NC	NC	NC	NC	NC	0.02	0.01	0.01	0.01	0.01
Propionaldehyde	NC	NC	NC	NC	NC	0.10	0.01	0.02	0.01	0.01
Propylene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Propylbenzene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Styrene	NC	NC	NC	NC	NC	0.01	NC	0.00	0.00	0.00
Toluene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
1,2,3-Trimethylbenzene	NC	NC	NC	NC	NC	0.10	0.03	0.02	0.03	0.02
1,2,4-Trimethylbenzene	NC	NC	NC	NC	NC	0.16	0.13	0.07	0.13	0.06
1,3,5-Trimethylbenzene	NC	NC	NC	NC	NC	0.04	0.04	0.02	0.01	0.01
m-Xylene/p-Xylene	NC	NC	NC	NC	NC	0.05	0.04	0.02	0.01	0.01
o-Xylene	NC	NC	NC	NC	NC	0.01	0.01	0.00	0.00	0.00
Aliphatic hydrocarbons C5-C8	1.44E-05	1.19E-05	7.78E-06	7.15E-06	5.94E-06	0.13	0.10	0.07	0.06	0.05
Aliphatic hydrocarbons C9-C18	3.16E-04	3.78E-05	1.51E-05	1.22E-05	8.94E-06	0.70	0.08	0.03	0.03	0.02
Aromatic hydrocarbons C9-C16	NC	NC	NC	NC	NC	0.02	0.02	0.01	0.01	0.01
Cumulative Cancer Risk and Noncancer Hazard Index (HI) for all chemicals	4.43E-04 (1.13E-04)*	1.79E-04 (1.29E-04)*	1.53E-04 (1.34E-04)*	1.51E-04 (1.32E-04)*	9.81E-05 (8.31E-05)*	1.83 (1.0) *	1.06 (0.9) *	0.73 (0.6) *	0.75 (0.6)*	0.56 (0.5) *

NC = NonCarcinogen; NA = Not Available. *The Estimated Cumulative Cancer Risk and noncancer hazard estimates without hydrocarbons.

Table 13. Comparison of the Estimated Cancer Risks and Noncancer Hazard Quotients (HQs) from 2008 to 2012 at the Rifle Monitoring Site.

Compound	RIFLE Cancer Risk					RIFLE Non-Cancer Hazard Quotients (HQs)				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Acetaldehyde	3.81E-06	3.46E-06	3.57E-06	3.53E-06	2.65E-06	0.19	0.17	0.18	0.18	0.13
Acetone	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Benzene	1.45E-05	1.98E-05	1.24E-05	1.11E-05	8.50E-06	0.06	0.08	0.05	0.05	0.04
1,3-Butadiene	4.44E-06	4.14E-06	6.87E-06	7.05E-06	6.33E-06	0.07	0.07	0.11	0.12	0.11
Crotonaldehyde	1.01E-04	1.08E-04	1.17E-04	1.03E-04	7.33E-05	NA	NA	NA	NA	NC
Cyclohexane	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Ethylbenzene	1.32E-06	1.56E-06	6.80E-06	9.60E-07	7.20E-07	0.00	0.00	0.00	0.00	0.00
Formaldehyde	2.76E-05	2.41E-05	2.54E-05	2.73E-05	2.05E-05	0.22	0.19	0.20	0.21	0.16
n-Hexane	NC	NC	NC	NC	NC	0.01	0.01	0.01	0.01	0.00
Isopropylbenzene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Methylcyclohexane	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Nonane	NC	NC	NC	NC	NC	0.00	0.01	0.00	0.00	0.00
Pentane	NC	NC	NC	NC	NC	0.01	0.01	0.01	0.01	0.01
Propionaldehyde	NC	NC	NC	NC	NC	0.12	0.02	0.02	0.02	0.02
Propylene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Propylbenzene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Styrene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
Toluene	NC	NC	NC	NC	NC	0.00	0.00	0.00	0.00	0.00
1,2,3-Trimethylbenzene	NC	NC	NC	NC	NC	0.03	0.04	0.03	0.03	0.03
1,2,4-Trimethylbenzene	NC	NC	NC	NC	NC	0.10	0.14	0.08	0.07	0.08
1,3,5-Trimethylbenzene	NC	NC	NC	NC	NC	0.02	0.02	0.02	0.01	0.01
m-Xylene/p-Xylene	NC	NC	NC	NC	NC	0.03	0.03	0.02	0.01	0.01
o-Xylene	NC	NC	NC	NC	NC	0.01	0.01	0.01	0.00	0.00
Aliphatic hydrocarbons C5-C8	8.60E-06	1.17E-05	7.76E-06	6.96E-06	5.21E-06	0.08	0.10	0.07	0.06	0.05
Aliphatic hydrocarbons C9-C18	1.65E-05	2.04E-05	1.22E-05	1.10E-05	8.02E-06	0.04	0.05	0.03	0.02	0.02
Aromatic hydrocarbons C9-C16	NC	NC	NC	NC	NC	0.01	0.02	0.01	0.01	0.01
Cumulative Cancer Risk and Noncancer Hazard Index (HI)	1.78E-04 (1.53E-04)*	1.93E-04 (1.61E-04)*	1.92E-04 (1.72E-04)*	1.71E-04 (1.53E-04)*	1.25E-04 (1.12E-04)*	1.0 (0.9) *	0.99 (0.8) *	0.85 (0.7) *	0.82 (0.7) *	0.68 (0.6) *

NC = Non-Carcinogen; NA = Not Available; *The Estimated Cumulative Cancer Risk and noncancer hazards without hydrocarbons

Table 14. Summary of Major Changes in the Estimated Chronic Risk Pattern from 2008 to 2012 at the Bell, Parachute and Rifle Monitoring Sites.

Cumulative Risk at Monitoring Sites	2008		2012	
	Chronic Health risk	Risk driving chemical groups (% contribution)	Chronic Health risk	Risk driving chemical groups (% contribution)
CANCER RISK ESTIMATES*				
BELL	351 in one million	- Carbonyls without acetone (29%) -SNMOCs without hydrocarbons (4%) -Hydrocarbons (67%)	166 in one million (2-fold decrease)	- Carbonyls without acetone (87%) - SNMOCs without hydrocarbons (6%) -Hydrocarbons (7%)
PARACHUTE	443 in one million	- Carbonyls without acetone(20%) - SNMOCs without hydrocarbons (6%) -Hydrocarbons (74%)	98 in one million (4.5 fold decrease)	-Carbonyls without acetone (70%) - SNMOCs without hydrocarbons (15%) -Hydrocarbons (15%)
RIFLE	178 in one million	- Carbonyls without acetone (74%) - SNMOCs without hydrocarbons (12%) --Hydrocarbons (14%)	125 in one million (1.4- fold decrease)	Carbonyls without acetone (77%) - SNMOCs without hydrocarbons (12%) -Hydrocarbons (11%)
NONCANCER HAZARD ESTIMATES (Hazard Index)**				
BELL	1.1	- Carbonyls without acetone (27%) - SNMOCs without hydrocarbons (18%) - Hydrocarbons (55%)	0.5 (2-fold decrease)	- Carbonyls without acetone (40%) - SNMOCs without hydrocarbons (40%) -Hydrocarbons (20%)
PARACHUTE	1.8	- Carbonyls without acetone(22%) - SNMOCs without hydrocarbons (33%) -Hydrocarbons (45%)	0.6 (3-fold decrease)	- Carbonyls without acetone (33%) - SNMOCs without hydrocarbons (50%) -Hydrocarbons (17%)
RIFLE	1.0	-Carbonyls without acetone(50%) - SNMOCs without hydrocarbons (40%) -Hydrocarbons (10%)	0.7 (1.4 fold decrease)	- Carbonyls without acetone (43%) - SNMOCs without hydrocarbons (43%) -Hydrocarbons (14%)

*EPA's acceptable cancer risk range is one to one-hundred in one million; ** EPA's acceptable noncancer health based benchmark or acceptable level is one