

Analysis of Air Monitoring Data Collected During Oil Field Well Stimulation Treatments in California: Implications for Human Health

Appendix B

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Table B-1. Matrix of association between wells, producers, consultants, data, and reports. Adapted from Stringfellow and Camarillo (2020).

Well API	Field	Report No. ^{b,c}	Producer	Consultant	Data provided	Monitoring report provided
030-62645 ^a 030-60845	South Belridge	NA ^e	Company-1	Not known	Y	NA ^{e,h}
030-64286	- ^d	NA ^e	Company-2	Not known	Y	NA ^{e,h}
030-54057	North Belridge	1	Company-3	Consultant-1	Y	Y
030-55914	North Belridge	1	Company-3	Consultant-1	Y	Y
030-55084	Lost Hills	2	Company-1	Consultant-1	Y	Y
030-62399	Lost Hills	3	Company-4	Consultant-2	Y	Y
030-62361	Lost Hills	3	Company-4	Consultant-2	Y	Y
030-62398	Lost Hills	3	Company-4	Consultant-2	Y	Y
030-55090 ^a 030-55091	Lost Hills	4	Company-1	Consultant-1	Y	Y
030-62130	Lost Hills	5	Company-4	Consultant-2	Y ^f	Y
030-62132	Lost Hills	5	Company-4	Consultant-2	Y ^f	Y
030-62142	Lost Hills	5	Company-4	Consultant-2	Y ^f	Y
030-60081	South Belridge	6	Company-1	Consultant-1	Y	Y
030-60844	South Belridge	7	Company-1	Consultant-1	Y	Y
030-60841	South Belridge	8	Company-1	Consultant-1	Y	Y
030-63550	South Belridge	9	Company-1	Consultant-1	Y	Y
029-27186	South Belridge	10	Company-2	Consultant-3	Y	Y
030-59958	South Belridge	11	Company-5	Consultant-1	Y	Y
030-59872	South Belridge	11	Company-5	Consultant-1	Y	Y
030-60386	South Belridge	11	Company-5	Consultant-1	Y	Y
030-53804	South Belridge	12	Company-3	Consultant-1	Y	Y
030-63120	- ^d	13	Company-2	Consultant-1	Y	Y
030-62169	- ^d	14	Company-2	Consultant-1	Y	Y
030-63043	- ^d	15	Company-2	Consultant-1	Y	Y
030-60471	Elk Hills	16	Company-2	Consultant-3	Y	Y
030-62704	Elk Hills	17	Company-2	Consultant-3	Y	Y
029-59550	South Belridge	18	Company-2	Consultant-4	NA ^{e,g}	Y
030-54264	Elk Hills	19	Company-2	Consultant-4	NA ^{e,g}	Y

^a Two stimulated wells were included in a single monitoring event, therefore only one API will be referenced here forward.

^b Multiple wells may be included in one report as indicated by shared report numbers.

^c Report number order assigned by S&A for tracking purposes, only.

^d Field not specified in CalGEM Well Finder. <https://www.conservation.ca.gov/calgem/Pages/WellFinder.aspx>.

^e Not available.

^f Only monitored for greenhouse gasses.

^g Severe weather contaminated sampling media and invalidated the data. Data was not used for this study.

^h Retests of TO-13 in SIM mode, separate reports were not created.

Table B-2. Monitored compounds (N=166). Compounds detected in at least one sample are shown in bold italics.

Analyte	Analyte
<i>1,1-Dichloroethane</i>	<i>2,5-Dimethyl Benzaldehyde</i>
<i>1,1-Dichloroethene</i>	2,6-Dinitrotoluene
<i>1,1,1-Trichloroethane</i>	3 & 4 Methylphenol
<i>1,1,2-Trichloro-1,2,2-Trifluoroethane</i>	3-Nitroaniline
<i>1,1,2-Trichloroethane</i>	3,3'-Dichlorobenzidine
<i>1,1,2,2-Tetrachloroethane</i>	4-Bromophenyl Phenyl Ether
1,2-Dibromoethane	4-Chloro-3-Methylphenol
<i>1,2-Dichloro-1,1,2,2-Tetrafluoroethane</i>	4-Chloroaniline
1,2-Dichlorobenzene	4-Chlorophenyl Phenyl Ether
<i>1,2-Dichloroethane</i>	<i>4-Ethyltoluene</i>
1,2-Dichloropropane	<i>4-Methyl-2-Pentanone</i>
1,2,3-Trichloropropane	4-Nitroaniline
<i>1,2,4-Trichlorobenzene</i>	4-Nitrophenol
<i>1,2,4-Trimethylbenzene</i>	4,6-Dinitro-2-Methylphenol
<i>1,3-Butadiene</i>	Acenaphthene
1,3-Butylene Glycol	Acenaphthylene
1,3-Dichlorobenzene	<i>Acetaldehyde</i>
<i>1,3,5-Trimethylbenzene</i>	<i>Acetone</i>
<i>1,4-Dichlorobenzene</i>	Acrolein
1,4-Dioxane	Acrylonitrile
<i>2-Butanone</i>	Allyl Chloride
2-Chloronaphthalene	Anthracene
2-Chlorophenol	<i>Benzaldehyde</i>
<i>2-Hexanone</i>	<i>Benzene</i>
<i>2-Methylnaphthalene</i>	Benzo[a]anthracene
2-Methylphenol	Benzo[a]pyrene
2-Nitroaniline	Benzo[b]fluoranthene
2-Nitrophenol	Benzo[g,h,i]perylene
2-Propanol	Benzo[k]fluoranthene
<i>2,2,4-Trimethylpentane</i>	Benzyl Alcohol
2,4-Dichlorophenol	Benzyl Chloride
2,4-Dimethylphenol	Bis(2-Chloroethoxy)methane
2,4-Dinitrophenol	Bis(2-Chloroethyl)ether
2,4-Dinitrotoluene	Bis(2-Chloroisopropyl)ether
2,4,5-Trichlorophenol	<i>Bis(2-Ethylhexyl)phthalate</i>
2,4,6-Trichlorophenol	Bromodichloromethane
Bromoform	Hexachloro-1,3-Cyclopentadiene

Analyte	Analyte
Bromomethane	Hexachlorobenzene
<i>Butane</i>	Hexachlorobutadiene
Butyl Benzyl Phthalate	Hexachloroethane
<i>Butyraldehyde</i>	<i>Hexaldehyde</i>
<i>C-1,2-Dichloroethene</i>	<i>Hexane</i>
C-1,3-Dichloropropene	<i>Hydrogen</i>
<i>Carbon Dioxide</i>	<i>I-Butane</i>
<i>Carbon Disulfide</i>	I-Pentane
Carbon Monoxide	Indeno[1,2,3-cd]Pyrene
<i>Carbon Tetrachloride</i>	Isophorone
Chlorobenzene	Isovaleraldehyde
<i>Chloroethane</i>	m-Tolualdehyde
<i>Chloroform</i>	<i>m,p-Xylene</i>
<i>Chloromethane</i>	<i>Methane</i>
Chrysene	Methanol
Crotonaldehyde	Methyl T-Butyl Ether
Cumene	<i>Methylene Chloride</i>
<i>Cyclohexane</i>	N-Nitrosodimethylamine
Decane	N-nitrosodiphenylamine
Di-n-Butyl Phthalate	N-Nitrososdi-n-Propylamine
Di-n-Octyl Phthalate	n-Valeraldehyde
Dibenz[a,h]anthracene	<i>Naphthalene</i>
Dibenzofuran	Neo-Butane
<i>Dibromochloromethane</i>	Neo-Pentane
<i>Dichlorodifluoromethane</i>	Nitrobenzene
Diethyl Phthalate	<i>Nitrogen</i>
Diethylene Glycol	<i>Nonane</i>
Dimethyl Phthalate	<i>o-Tolualdehyde</i>
<i>Ethane</i>	<i>o-Xylene</i>
<i>Ethanol</i>	<i>Octane</i>
Ethene	<i>Oxygen</i>
Ethyl Acetate	p-Tolualdehyde
<i>Ethylbenzene</i>	Pentachlorophenol
Ethylene Glycol	<i>Pentane</i>
Fluoranthene	Phenanthrene
Fluorene	Phenol
<i>Formaldehyde</i>	Propane
<i>Heptane</i>	Propene
<i>Propionaldehyde</i>	<i>Tetraethylene Glycol</i>

Analyte	Analyte
Propylene	Tetrahydrofuran
Propylene Glycol	<i>Toluene</i>
Pyrene	<i>Trichloroethene</i>
<i>Styrene</i>	<i>Trichlorofluoromethane</i>
T-1,2-Dichloroethene	Triethylene Glycol
T-1,3-Dichloropropene	Vinyl Acetate
<i>Tetrachloroethene</i>	Vinyl Chloride

Table B-3. Summary of results for all detected analytes¹ at ambient and background sites, showing percent detected when analyzed (% Det.); mean, median and maximum concentration (conc., µg/m³; 8-hr time-weighted average)²; the 95th percentile, indicating that 95% of the measurements were at or below this value. Sorted in alphabetical order.

Analyte	CASRN	Ambient					Background				
		% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.	% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.
1,1-Dichloroethane	75-34-3	0.0	-	-	-	-	0.0	-	-	-	-
1,1-Dichloroethene	75-35-4	0.0	-	-	-	-	0.0	-	-	-	-
1,1,1-Trichloroethane	71-55-6	0.0	-	-	-	-	0.0	-	-	-	-
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.1	0.036	0.000	0.323	0.500	0.1	0.029	0.000	0.172	0.490
1,1,2-Trichloroethane	79-00-5	0.0	-	-	-	-	0.0	-	-	-	-
1,1,2,2-Tetrachloroethane	79-34-5	0.0	-	-	-	-	0.0	-	-	-	-
1,2-Dichloro-1,1,2,2-Tetrafluoroethane	76-14-2	0.1	0.008	0.000	0.075	0.100	0.1	0.012	0.000	0.100	0.100
1,2-Dichloroethane	107-06-2	0.1	0.004	0.000	0.035	0.049	0.1	0.007	0.000	0.058	0.059
1,2,4-Trichlorobenzene	120-82-1	0.0	-	-	-	-	0.0	-	-	-	-
1,2,4-Trimethylbenzene	95-63-6	0.1	0.274	0.000	0.172	6.882	0.1	0.070	0.000	0.587	0.620
1,3-Butadiene	106-99-0	0.0	-	-	-	-	0.0	-	-	-	-
1,3,5-Trimethylbenzene	108-67-8	0.0	0.140	0.000	0.000	3.638	0.1	0.029	0.000	0.235	0.300
1,4-Dichlorobenzene	106-46-7	0.0	0.001	0.000	0.000	0.016	0.1	0.003	0.000	0.025	0.027
2-Butanone	78-93-3	0.3	2.553	0.000	10.327	27.133	0.5	4.864	1.400	5.559	103.225
2-Hexanone	591-78-6	0.1	0.145	0.000	1.133	2.253	0.0	-	-	-	-
2-Methylnaphthalene	91-57-6	0.0	-	-	-	-	0.0	-	-	-	-
2,2,4-Trimethylpentane	540-84-1	0.0	0.134	0.000	0.000	3.224	0.0	-	-	-	-
2,5-Dimethyl Benzaldehyde	5779-94-2	0.0	0.018	0.000	0.000	0.460	0.0	-	-	-	-
4-Ethyltoluene	622-96-8	0.1	0.214	0.000	1.843	3.097	0.1	0.072	0.000	0.580	0.730
4-Methyl-2-Pentanone	108-10-1	0.0	0.173	0.000	0.000	4.506	0.0	-	-	-	-
Acetaldehyde	75-07-0	0.8	2.393	1.485	5.678	5.900	0.6	2.082	1.182	5.500	16.000
Acetone	67-64-1	0.8	3.353	2.040	13.165	14.100	0.7	2.403	2.350	5.265	5.720
Benzaldehyde	100-52-7	0.2	0.219	0.000	1.617	2.040	0.2	0.150	0.000	0.650	2.650
Benzene	71-43-2	0.3	11.824	0.000	86.581	188.486	0.3	0.394	0.000	1.890	2.172

Analyte	CASRN	Ambient					Background				
		% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.	% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.
Bis(2-Ethylhexyl)phthalate	117-81-7	0.0	-	-	-	-	0.0	-	-	-	-
Butane	106-97-8	1.0	13.458	4.996	21.786	156.888	0.9	13.703	11.767	36.132	66.559
Butyraldehyde	123-72-8	0.1	0.048	0.000	0.308	0.847	0.1	0.081	0.000	0.314	1.750
C-1,2-Dichloroethene	156-59-2	0.0	0.085	0.000	0.000	2.220	0.0	-	-	-	-
Carbon Dioxide (%v/v)	124-38-9	0.2	0.009	0	0.046	0.000	0.2	0.007	0.000	0.044	0.045
Carbon Disulfide	75-15-0	0.1	6.849	0.000	7.426	168.162	0.2	1.301	0.000	8.097	8.097
Carbon Tetrachloride	56-23-5	0.2	0.063	0.000	0.414	0.440	0.2	0.069	0.000	0.392	0.440
Chloroethane	75-00-3	0.0	-	-	-	-	0.0	-	-	-	-
Chloroform	67-66-3	0.1	0.007	0.000	0.063	0.093	0.1	0.009	0.000	0.078	0.084
Chloromethane	74-87-3	0.3	0.578	0.000	2.024	2.272	0.2	0.330	0.000	1.902	1.982
Cyclohexane	110-82-7	0.2	0.127	0.000	0.826	1.170	0.5	1.090	0.000	3.524	7.573
Dibromochloromethane	124-48-1	0.0	-	-	-	-	0.0	-	-	-	-
Dichlorodifluoromethane	75-71-8	0.6	1.314	1.964	2.905	3.066	0.7	1.531	2.052	2.594	2.819
Ethane	74-84-0	0.0	-	-	-	-	0.0	-	-	-	-
Ethanol	64-17-5	0.7	7.862	7.469	0.000	22.611	0.9	6.280	6.406	10.135	22.611
Ethylbenzene	100-41-4	0.2	0.229	0.000	0.137	5.645	0.2	0.130	0.000	0.957	1.100
Formaldehyde	50-00-0	1.0	3.452	3.010	6.200	6.400	1.0	3.227	2.860	6.595	6.700
Heptane	142-82-5	0.2	0.166	0.000	1.175	1.393	0.2	0.927	0.000	4.900	5.737
Hexaldehyde	66-25-1	0.1	0.210	0.000	1.985	2.510	0.1	0.237	0.000	1.330	4.080
Hexane	110-54-3	0.2	19.524	0.000	156.701	292.554	0.3	13.664	0.000	81.809	211.485
Hydrogen (%v/v)	1333-74-0	0.0	0.001	0	0.000	0.000	0.0	-	-	-	-
I-Butane	75-28-5	0.9	2.792	2.151	6.703	7.607	0.9	5.961	5.705	15.831	22.582
m,p-Xylene	1330-20-7	0.2	0.945	0.000	8.217	13.026	0.2	0.474	0.000	3.640	3.900
Methane (%v/v)	74-82-8	0.9	0.000	0.000	0.001	0.000	1.0	0.000	0.000	0.001	0.001
Methylene Chloride	75-09-2	0.2	0.823	0.000	3.707	15.284	0.2	0.506	0.000	1.031	13.547
Naphthalene	91-20-3	0.1	0.009	0.000	0.037	0.180	0.1	0.022	0.000	0.146	0.320
Nitrogen (%v/v)	7727-37-9	0.9	71.793	77.5	79.000	0.000	1.0	76.654	77.000	79.150	80.000

Analyte	CASRN	Ambient					Background				
		% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.	% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.
Nonane	111-84-2	0.2	1.573	0.000	8.914	14.157	0.0	-	-	-	-
o-Tolualdehyde	529-20-4	0.0	-	-	-	-	0.0	-	-	-	-
o-Xylene	1330-20-7	0.2	0.325	0.000	2.662	4.777	0.2	0.150	0.000	1.135	1.200
Octane	111-65-9	0.0	0.101	0.000	0.000	2.429	0.2	1.122	0.000	8.410	8.800
Oxygen (%v/v)	7782-44-7	1.0	18.726	19	22.000	0.000	1.0	17.606	19.000	21.000	22.000
Pentane	109-66-0	0.3	1.194	0.000	6.094	6.492	0.7	4.392	3.631	15.979	25.378
Propionaldehyde	123-38-6	0.4	0.203	0.000	0.807	0.929	0.4	0.175	0.000	0.536	1.690
Styrene	100-42-5	0.0	-	-	-	-	0.0	-	-	-	-
Tetrachloroethene	127-18-4	0.2	4.354	0.000	9.495	88.171	0.1	0.194	0.000	0.190	6.172
Tetraethylene Glycol	112-60-7	0.0	-	-	-	-	0.0	-	-	-	-
Toluene	108-88-3	0.3	0.960	0.000	3.533	10.929	0.3	0.738	0.000	3.876	4.522
Trichloroethene	79-01-6	0.0	0.001	0.000	0.000	0.023	0.1	0.003	0.000	0.026	0.039
Trichlorofluoromethane	75-69-4	0.2	0.178	0.000	1.160	1.236	0.2	0.189	0.000	1.083	1.236

¹ Detected analytes shown were detected in at least one sample across all sites; some were not detected at ambient or background locations (i.e., concentrations shown as “-”).

² Measurements of atmospheric gases (carbon dioxide, hydrogen, methane, nitrogen, and oxygen) are shown in %v/v.

Table B-4. Summary of results for all detected analytes¹ at HyF and cleanout sites, showing percent detected when analyzed (% Det.); mean, median and maximum concentration (conc., µg/m³; 8-hr time-weighted average)²; the 95th percentile, indicating that 95% of the measurements were at or below this value. Sorted in alphabetical order.

Analyte	CASRN	HyF					Cleanout				
		% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.	% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.
1,1-Dichloroethane	75-34-3	0.0	0.000	0.000	0.000	0.012	0.0	-	-	-	-
1,1-Dichloroethene	75-35-4	0.0	0.000	0.000	0.000	0.069	0.0	-	-	-	-
1,1,1-Trichloroethane	71-55-6	0.0	0.001	0.000	0.000	0.049	0.0	-	-	-	-
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.1	0.032	0.000	0.000	0.950	0.1	0.036	0.000	0.450	0.520
1,1,2-Trichloroethane	79-00-5	0.0	-	-	-	-	0.0	0.014	0.000	0.000	2.510
1,1,2,2-Tetrachloroethane	79-34-5	0.0	-	-	-	-	0.0	0.000	0.000	0.000	0.080
1,2-Dichloro-1,1,2,2-Tetrafluoroethane	76-14-2	0.1	0.009	0.000	0.098	0.110	0.1	0.010	0.000	0.100	0.120
1,2-Dichloroethane	107-06-2	0.1	0.005	0.000	0.050	0.066	0.1	0.005	0.000	0.052	0.066
1,2,4-Trichlorobenzene	120-82-1	0.0	-	-	-	-	0.0	0.040	0.000	0.000	6.679
1,2,4-Trimethylbenzene	95-63-6	0.1	0.027	0.000	0.282	0.580	0.1	0.100	0.000	0.440	6.882
1,3-Butadiene	106-99-0	0.0	0.005	0.000	0.000	0.575	0.0	0.002	0.000	0.000	0.160
1,3,5-Trimethylbenzene	108-67-8	0.0	0.002	0.000	0.000	0.240	0.0	0.024	0.000	0.000	3.490
1,4-Dichlorobenzene	106-46-7	0.1	0.001	0.000	0.017	0.028	0.1	0.002	0.000	0.018	0.045
2-Butanone	78-93-3	0.3	1.058	0.000	0.000	11.502	0.2	0.691	0.000	3.310	41.290
2-Hexanone	591-78-6	0.0	0.026	0.000	0.000	1.511	0.0	-	-	-	-
2-Methylnaphthalene	91-57-6	0.0	0.013	0.000	0.000	0.910	0.0	0.024	0.000	0.000	1.600
2,2,4-Trimethylpentane	540-84-1	0.0	0.013	0.000	0.000	2.383	0.0	0.022	0.000	0.000	3.738
2,5-Dimethyl Benzaldehyde	5779-94-2	0.1	0.039	0.000	0.450	0.630	0.0	0.008	0.000	0.000	0.550
4-Ethyltoluene	622-96-8	0.1	0.066	0.000	0.232	4.080	0.1	0.141	0.000	0.521	4.916
4-Methyl-2-Pentanone	108-10-1	0.0	0.106	0.000	0.000	10.241	0.0	0.624	0.000	0.000	94.220
Acetaldehyde	75-07-0	0.7	1.956	1.610	5.800	13.700	0.6	1.511	0.854	5.740	13.500
Acetone	67-64-1	0.8	2.700	2.460	7.500	17.000	0.6	1.715	0.878	5.640	8.980

Analyte	CASRN	HyF					Cleanout				
		% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.	% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.
Benzaldehyde	100-52-7	0.1	0.097	0.000	0.471	3.840	0.1	0.076	0.000	0.514	3.060
Benzene	71-43-2	0.2	0.279	0.000	1.629	4.153	0.2	0.279	0.000	1.572	4.473
Bis(2-Ethylhexyl)phthalate	117-81-7	0.0	-	-	-	-	0.0	0.160	0.000	0.000	7.200
Butane	106-97-8	1.0	26.028	7.284	95.797	1354.945	0.9	16.726	9.508	55.862	147.380
Butyraldehyde	123-72-8	0.0	0.024	0.000	0.000	1.710	0.0	0.016	0.000	0.000	1.620
C-1,2-Dichloroethene	156-59-2	0.0	0.001	0.000	0.000	0.151	0.0	0.005	0.000	0.000	0.872
Carbon Dioxide	124-38-9	0.2	0.008	0.000	0.045	0.047	0.2	0.010	0.000	0.045	0.410
Carbon Disulfide	75-15-0	0.1	0.554	0.000	5.294	9.342	0.0	0.379	0.000	0.000	23.356
Carbon Tetrachloride	56-23-5	0.1	0.056	0.000	0.390	0.447	0.2	0.059	0.000	0.401	0.447
Chloroethane	75-00-3	0.0	0.003	0.000	0.000	0.100	0.0	-	-	-	-
Chloroform	67-66-3	0.1	0.012	0.000	0.092	0.440	0.1	0.019	0.000	0.100	0.780
Chloromethane	74-87-3	0.3	0.579	0.000	2.065	3.717	0.3	0.448	0.000	1.879	2.891
Cyclohexane	110-82-7	0.3	1.541	0.000	8.950	55.074	0.5	1.833	0.000	6.970	18.243
Dibromochloromethane	124-48-1	0.0	0.018	0.000	0.000	3.493	0.0	-	-	-	-
Dichlorodifluoromethane	75-71-8	0.6	1.436	2.000	2.819	3.214	0.7	1.571	2.028	2.803	3.066
Ethane	74-84-0	0.0	0.000	0.000	0.000	0.001	0.0	-	-	-	-
Ethanol	64-17-5	0.9	6.958	5.841	12.511	170.000	0.8	5.008	4.145	13.218	22.611
Ethylbenzene	100-41-4	0.1	0.078	0.000	0.246	5.211	0.2	0.104	0.000	0.307	4.777
Formaldehyde	50-00-0	1.0	3.122	2.920	6.200	8.090	0.9	2.343	1.930	6.030	7.120
Heptane	142-82-5	0.2	0.597	0.000	3.369	20.491	0.2	0.851	0.000	4.938	13.934
Hexaldehyde	66-25-1	0.2	0.207	0.000	0.621	5.070	0.1	0.226	0.000	2.500	4.610
Hexane	110-54-3	0.4	27.679	0.000	203.025	634.454	0.4	57.159	0.000	528.712	951.681
Hydrogen	1333-74-0	0.0	-	-	-	-	0.0	0.001	0.000	0.000	0.036
I-Butane	75-28-5	0.8	8.415	2.377	31.378	451.648	0.8	3.894	2.734	13.371	40.411
m,p-Xylene	1330-20-7	0.2	0.260	0.000	0.787	13.894	0.2	0.454	0.000	2.034	11.723

Analyte	CASRN	HyF					Cleanout				
		% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.	% Det.	Mean Conc.	Median Conc.	95% Value	Max Conc.
Methane	74-82-8	0.9	0.000	0.000	0.001	0.001	0.9	0.000	0.000	0.001	0.009
Methylene Chloride	75-09-2	0.1	0.710	0.000	2.654	65.000	0.1	0.137	0.000	0.554	5.558
Naphthalene	91-20-3	0.1	0.047	0.000	0.069	5.085	0.1	0.007	0.000	0.051	0.200
Nitrogen	7727-37-9	1.0	72.596	77.000	79.000	85.000	0.9	73.169	78.000	79.650	83.000
Nonane	111-84-2	0.0	-	-	-	-	0.0	-	-	-	-
o-Tolualdehyde	529-20-4	0.0	0.012	0.000	0.000	0.388	0.1	0.016	0.000	0.210	0.485
o-Xylene	1330-20-7	0.2	0.071	0.000	0.268	3.952	0.2	0.126	0.000	0.412	3.430
Octane	111-65-9	0.1	0.248	0.000	2.773	5.139	0.0	0.152	0.000	0.000	5.139
Oxygen	7782-44-7	1.0	18.325	19.000	23.000	32.000	1.0	17.932	19.000	21.000	23.000
Pentane	109-66-0	0.5	8.464	0.000	29.362	560.675	0.5	3.569	2.400	13.220	25.673
Propionaldehyde	123-38-6	0.3	0.146	0.000	0.568	1.710	0.2	0.051	0.000	0.375	0.894
Styrene	100-42-5	0.0	0.011	0.000	0.000	2.172	0.0	-	-	-	-
Tetrachloroethene	127-18-4	0.1	0.251	0.000	0.096	21.001	0.1	0.006	0.000	0.026	0.285
Tetraethylene Glycol	112-60-7	0.0	0.127	0.000	0.000	13.000	0.0	4.889	0.000	0.000	260.000
Toluene	108-88-3	0.3	1.106	0.000	4.747	31.279	0.4	1.060	0.000	3.716	15.828
Trichloroethene	79-01-6	0.1	0.362	0.000	0.025	50.004	0.0	0.046	0.000	0.000	6.449
Trichlorofluoromethane	75-69-4	0.1	0.170	0.000	1.180	2.500	0.2	0.161	0.000	1.104	1.292

¹ Detected analytes shown were detected in at least one sample across all sites; some were not detected at HyF or cleanout locations (i.e., concentrations shown as “-”).

² Measurements of atmospheric gases (carbon dioxide, hydrogen, methane, nitrogen, and oxygen) are shown in %v/v

Table B-5. Compounds detected in at least one sample and with available acute and/or chronic non-cancer health guidance values (N=40).¹

Analyte (CASRN)	% Det.	Acute			Chronic		
		Guidance value (µg/m ³)	Source	Target Organ System	Guidance value (µg/m ³)	Source	Target Organ System
1,1-Dichloroethene (75-35-4)	0.2	-	-	-	1.00E+00	ATSDR	Respiratory system, alimentary system
1,1,1-Trichloroethane (71-55-6)	1.2	6.80E+04	OEHHA	Nervous system	1.00E+03	OEHHA	Nervous system
1,1,2-Trichloro-1,2,2-Trifluoroethane (76-13-1)	7.0	5.00E+04	PPRTV (Subchronic)	Alimentary tract, respiratory system	-	-	-
1,1,2-Trichloroethane (79-00-5)	0.2	1.57E+02	ATSDR MRL	Respiratory system	-	-	-
1,1,2,2-Tetrachloroethane (79-34-5)	0.2	-	-	-	-	-	-
1,2-Dichloroethane (107-06-2)	9.8	7.00E+01	PPRTV (Subchronic)	Nervous system	4.00E+02	OEHHA	Alimentary tract
1,2,4-Trichlorobenzene (120-82-1)	0.5	2.00E+01	PPRTV (Subchronic)	Alimentary tract	-	-	-
1,2,4-Trimethylbenzene (95-63-6)	10.5	2.00E+02	EPA IRIS (Subchronic)	Nervous system	6.00E+01	EPA IRIS (Chronic)	Nervous system
1,3-Butadiene (106-99-0)	1.2	6.60E+02	OEHHA	Developmental	2.00E+00	OEHHA	Reproductive
1,3,5-Trimethylbenzene (108-67-8)	2.8	2.00E+02	EPA IRIS (Subchronic)	Nervous system	6.00E+01	EPA IRIS (Chronic)	Nervous system
1,4-Dichlorobenzene (106-46-7)	6.5	1.24E+04	ATSDR	Respiratory system	6.18E+01	OEHHA	Nervous system, alimentary tract, respiratory system
2-Butanone (78-93-3)	25.4	1.30E+04	OEHHA	Eyes, respiratory system	5.00E+03	EPA IRIS (Chronic)	Developmental

Analyte (CASRN)	% Det.	Acute			Chronic		
		Guidance value ($\mu\text{g}/\text{m}^3$)	Source	Target Organ System	Guidance value ($\mu\text{g}/\text{m}^3$)	Source	Target Organ System
2-Hexanone (591-78-6)	1.4	-	-	-	3.00E+01	EPA IRIS (Chronic)	Nervous system
4-Methyl-2-Pentanone (108-10-1)	2.8	-	-	-	3.00E+03	EPA IRIS (Chronic)	Developmental
Acetaldehyde (75-07-0)	61.5	4.70E+02	OEHHA	Eyes, respiratory system	9.00E+00	EPA IRIS (Chronic)	Nervous system, respiratory system
Acetone (67-64-1)	67.0	6.18E+04	ATSDR	Nervous system	3.09E+04	ATSDR	Nervous system
Benzene (71-43-2)	23.5	2.70E+01	OEHHA	Hematological, immune system, developmental	3.00E+00	OEHHA	Hematological system
Carbon Disulfide (75-15-0)	9.1	6.20E+03	OEHHA	Nervous system, reproductive, developmental	7.00E+02	EPA IRIS (Chronic)	Nervous system, reproductive
Carbon Tetrachloride (56-23-5)	14.9	1.90E+03	OEHHA	Nervous system, alimentary tract, reproductive, developmental, physiological response to odors	4.00E+01	OEHHA	Nervous system, alimentary tract, developmental
Chloroethane (75-00-3)	1.9	3.96E+04	ATSDR	Developmental	1.00E+04	EPA IRIS (Chronic)	Developmental
Chloroform (67-66-3)	9.8	1.50E+02	OEHHA	Nervous system, reproductive, developmental, respiratory system	9.77E+01	ATSDR	Alimentary tract, developmental
Chloromethane (74-87-3)	31.8	1.03E+03	ATSDR	Nervous system	9.00E+01	EPA IRIS (Chronic)	Nervous system
Cyclohexane (110-82-7)	39.2	1.80E+04	PPRTV (Subchronic)	Developmental	6.00E+03	EPA IRIS (Chronic)	Developmental
Dichlorodifluoromethane (75-71-8)	62.5	1.00E+03	PPRTV (Subchronic)	General toxicity	-	-	-
Ethylbenzene (100-41-4)	16.3	2.17E+04	ATSDR	Nervous system	2.61E+02	ATSDR	Alimentary tract, developmental, endocrine system

Analyte (CASRN)	% Det.	Acute			Chronic		
		Guidance value ($\mu\text{g}/\text{m}^3$)	Source	Target Organ System	Guidance value ($\mu\text{g}/\text{m}^3$)	Source	Target Organ System
Formaldehyde (50-00-0)	95.4	5.50E+01	OEHHA	Eyes	9.00E+00	OEHHA	Respiratory system
Heptane (142-82-5)	20.0	4.00E+03	PPRTV (Subchronic)	General toxicity	-	-	-
Hexane (110-54-3)	35.9	2.00E+03	PPRTV (Subchronic)	Nervous system	7.00E+02	EPA IRIS (Chronic)	Nervous system
m,p-Xylene (1330-20-7)	18.4	2.20E+04	OEHHA	Nervous system, respiratory system, eyes	1.00E+02	EPA IRIS (Chronic)	Nervous system
Methylene Chloride (75-09-2)	13.8	1.40E+04	OEHHA	Cardiovascular, nervous system	4.00E+02	OEHHA	Cardiovascular system, nervous system
Naphthalene (91-20-3)	10.3	-	-	-	3.00E+00	EPA IRIS (Chronic)	Nervous system, respiratory system
Nonane (111-84-2)	1.0	2.00E+02	PPRTV (Subchronic)	General toxicity	-	-	-
o-Xylene (1330-20-7)	16.8	2.20E+04	OEHHA	Nervous system, respiratory system, eyes	1.00E+02	EPA IRIS (Chronic)	Nervous system
Pentane (109-66-0)	50.4	1.00E+04	PPRTV (Subchronic)	Nervous system	-	-	-
Propionaldehyde (123-38-6)	28.7	-	-	-	8.00E+00	EPA IRIS (Chronic)	Nervous system, respiratory system
Styrene (100-42-5)	0.2	2.10E+04	OEHHA	Eyes, reproductive, developmental, respiratory system	8.52E+02	ATSDR	Nervous system
Tetrachloroethene (127-18-4)	9.6	2.00E+04	OEHHA	Nervous system, respiratory system, eyes	3.50E+01	OEHHA	Alimentary tract
Toluene (108-88-3)	33.1	3.70E+04	PPRTV (Subchronic)	Nervous system, eyes, reproductive, developmental, respiratory system	3.00E+02	OEHHA	Nervous system, developmental, respiratory system

Analyte (CASRN)	% Det.	Acute			Chronic		
		Guidance value (µg/m ³)	Source	Target Organ System	Guidance value (µg/m ³)	Source	Target Organ System
Trichloroethene (79-01-6)	5.8	-	-	-	2.00E+00	EPA IRIS (Chronic)	Immune system, developmental
Trichlorofluoromethane (75-69-4)	15.2	1.00E+03	PPRTV (Subchronic)	Nervous system	-	-	-

¹ Twenty-four compounds were detected in at least one sample but did not have acute and/or chronic non-cancer health benchmarks. These compounds included five atmospheric gases (carbon dioxide, hydrogen, methane, nitrogen, and oxygen) and nineteen additional compounds: 1,1,2,2-Tetrachloroethane (79-34-5); 1,2-Dichloro-1,1,2,2-Tetrafluoroethane (76-14-2); 2,2,4-Trimethylpentane (540-84-1); 2,5-Dimethyl Benzaldehyde (5779-94-2); 2-Methylnaphthalene (91-57-6); 4-Ethyltoluene (622-96-8); Benzaldehyde (100-52-7); Bis(2-Ethylhexyl)phthalate (117-81-7); Butane (106-97-8); Butyraldehyde (123-72-8); C-1,2-Dichloroethene (156-59-2); Dibromochloromethane (124-48-1); Ethane (74-84-0); Ethanol (64-17-5); Hexaldehyde (66-25-1); I-Butane (75-28-5); Octane (111-65-9); o-Tolualdehyde (529-20-4); and Tetraethylene Glycol (112-60-7).

Table B-6. Chronic HQ using median (8-hour TWA) concentrations (shown in Table B-2 and Table B-3), used to calculate HI shown in report Table 12.

Analyte (CASRN)	CHRONIC HQ				
	All Sites	Ambient	Background	HyF	Cleanout
1,1-Dichloroethene (75-35-4)	0.00E+00	- ¹	-	0.00E+00	-
1,1,1-Trichloroethane (71-55-6)	0.00E+00	-	-	0.00E+00	-
1,2-Dichloroethane (107-06-2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,2,4-Trimethylbenzene (95-63-6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene (106-99-0)	0.00E+00	-	-	0.00E+00	0.00E+00
1,3,5-Trimethylbenzene (108-67-8)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,4-Dichlorobenzene (106-46-7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Butanone (78-93-3)	0.00E+00	0.00E+00	2.80E-04	0.00E+00	0.00E+00
2-Hexanone (591-78-6)	0.00E+00	0.00E+00	-	0.00E+00	-
4-Methyl-2-Pentanone (108-10-1)	0.00E+00	0.00E+00	-	0.00E+00	0.00E+00
Acetaldehyde (75-07-0)	1.52E-01	1.65E-01	1.31E-01	1.79E-01	9.49E-02
Acetone (67-64-1)	5.59E-05	6.61E-05	7.61E-05	7.97E-05	2.84E-05
Benzene (71-43-2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Disulfide (75-15-0)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon Tetrachloride (56-23-5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroethane (75-00-3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform (67-66-3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloromethane (74-87-3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cyclohexane (110-82-7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene (100-41-4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Formaldehyde (50-00-0)	2.75E-01	3.34E-01	3.18E-01	3.24E-01	2.14E-01
Hexane (110-54-3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m,p-Xylene (1330-20-7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride (75-09-2)	0.00E+00	-	-	0.00E+00	-

Analyte (CASRN)	CHRONIC HQ				
	All Sites	Ambient	Background	HyF	Cleanout
Naphthalene (91-20-3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene (1330-20-7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propionaldehyde (123-38-6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene (100-42-5)	0.00E+00	-	-	0.00E+00	-
Tetrachloroethene (127-18-4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene (108-88-3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethene (79-01-6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

¹ '-' = Compound not detected.

Table B-7 Chronic HQ values using 95th percentile (8-hour TWA) (shown in Table B-2 and Table B-3), used to calculate HI shown in report Table 12.

Analyte (CASRN)	CHRONIC HQ				
	All Sites	Ambient	Background	HyF	Cleanout
1,1-Dichloroethene (75-35-4)	0.00E+00	- ¹	-	0.00E+00	-
1,1,1-Trichloroethane (71-55-6)	0.00E+00	-	-	0.00E+00	-
1,2-Dichloroethane (107-06-2)	1.30E-04	8.81E-05	1.44E-04	1.25E-04	1.30E-04
1,2,4-Trimethylbenzene (95-63-6)	6.17E-03	2.87E-03	9.79E-03	4.70E-03	6.17E-03
1,3-Butadiene (106-99-0)	0.00E+00	-	-	0.00E+00	0.00E+00
1,3,5-Trimethylbenzene (108-67-8)	0.00E+00	0.00E+00	3.92E-03	0.00E+00	0.00E+00
1,4-Dichlorobenzene (106-46-7)	2.99E-04	0.00E+00	4.11E-04	2.76E-04	2.99E-04
2-Butanone (78-93-3)	9.12E-04	2.07E-03	1.11E-03	0.00E+00	9.12E-04
2-Hexanone (591-78-6)	0.00E+00	3.78E-02	-	0.00E+00	-
4-Methyl-2-Pentanone (108-10-1)	0.00E+00	0.00E+00	-	0.00E+00	0.00E+00
Acetaldehyde (75-07-0)	6.44E-01	6.31E-01	6.11E-01	6.44E-01	6.44E-01
Acetone (67-64-1)	2.24E-04	4.26E-04	1.70E-04	2.43E-04	2.24E-04
Benzene (71-43-2)	5.77E-01	2.89E+01	6.30E-01	5.43E-01	5.77E-01
Carbon Disulfide (75-15-0)	6.76E-03	1.06E-02	1.16E-02	7.56E-03	6.76E-03
Carbon Tetrachloride (56-23-5)	1.02E-02	1.03E-02	9.81E-03	9.75E-03	1.02E-02
Chloroethane (75-00-3)	0.00E+00	-	-	0.00E+00	-
Chloroform (67-66-3)	9.42E-04	6.45E-04	8.00E-04	9.42E-04	9.42E-04
Chloromethane (74-87-3)	2.22E-02	2.25E-02	2.11E-02	2.29E-02	2.22E-02
Cyclohexane (110-82-7)	1.15E-03	1.38E-04	5.87E-04	1.49E-03	1.15E-03
Ethylbenzene (100-41-4)	1.15E-03	5.25E-04	3.67E-03	9.42E-04	1.15E-03
Formaldehyde (50-00-0)	7.00E-01	6.89E-01	7.33E-01	6.89E-01	7.00E-01
Hexane (110-54-3)	5.18E-01	2.24E-01	1.17E-01	2.90E-01	5.18E-01
m,p-Xylene (1330-20-7)	1.57E-02	8.22E-02	3.64E-02	7.87E-03	1.57E-02

Analyte (CASRN)	CHRONIC HQ				
	All Sites	Ambient	Background	HyF	Cleanout
Methylene Chloride (75-09-2)	3.20E-03	9.27E-03	2.58E-03	6.63E-03	3.20E-03
Naphthalene (91-20-3)	1.86E-02	1.25E-02	4.86E-02	2.29E-02	1.86E-02
o-Xylene (1330-20-7)	3.68E-03	2.66E-02	1.13E-02	2.68E-03	3.68E-03
Propionaldehyde (123-38-6)	6.87E-02	1.01E-01	6.70E-02	7.10E-02	6.87E-02
Styrene (100-42-5)	0.00E+00	-	-	0.00E+00	-
Tetrachloroethene (127-18-4)	2.61E-03	2.71E-01	5.43E-03	2.75E-03	2.61E-03
Toluene (108-88-3)	1.33E-02	1.18E-02	1.29E-02	1.58E-02	1.33E-02
Trichloroethene (79-01-6)	9.30E-03	0.00E+00	1.30E-02	1.25E-02	9.30E-03

¹ '-' = Compound not detected.

Table B-8. Mean, median, 95th percentile and maximum concentrations across all sites and CAL/OSHA permissible exposure limits (PEL) (8-hr TWA). Sorted by frequency of detection. No concentrations presented exceeded CAL/OSHA PELs.

Analyte (CASRN) ¹	% Det.	Mean Conc. (µg/m ³)	Median Conc. (µg/m ³)	95th percentile (µg/m ³)	Max Conc. (µg/m ³)	CAL/OSHA PEL	
						(ppm)	(µg/m ³)
Formaldehyde (75-34-3)	95.4	2.819	2.475	6.300	8.090	1	921
Ethanol (71-55-6)	82.1	6.141	5.464	13.604	170.000	1000	1,884,254
Acetone (76-13-1)	67.0	2.297	1.725	6.907	17.000	500	1,187,730
Acetaldehyde (79-00-5)	61.5	1.804	1.370	5.800	16.000	25 ²	45,041
Pentane (79-34-5)	50.4	5.661	2.361	16.761	560.675	600	1,770,552
Cyclohexane (76-14-2)	39.2	1.542	0.000	6.884	55.074	300	1,032,638
Hexane (107-06-2)	35.9	38.444	0.000	362.344	951.681	50	176,237
Toluene (106-99-0)	33.1	1.049	0.000	3.995	31.279	10	37,685
Chloromethane (106-46-7)	31.8	0.504	0.000	1.996	3.717	50	103,252
2-Butanone (78-93-3)	25.4	1.297	0.000	4.560	103.225	200	589,857
Benzene (591-78-6)	23.5	0.988	0.000	1.732	188.486	1	3,195
Heptane (91-57-6)	20.0	0.704	0.000	4.344	20.491	400	1,639,264
m,p-Xylene (108-10-1)	18.4	0.400	0.000	1.572	13.894	100	434,192
o-Xylene (75-07-0)	16.8	0.116	0.000	0.368	4.777	100	434,233
Ethylbenzene (67-64-1)	16.3	0.102	0.000	0.298	5.645	5	21,712
Carbon Tetrachloride (117-81-7)	14.9	0.059	0.000	0.409	0.447	2	12,582
Methylene Chloride (75-15-0)	13.8	0.460	0.000	1.281	65.000	25	86,840
Naphthalene (56-23-5)	10.3	0.026	0.000	0.056	5.085	0.1	524
1,2-Dichloro-1,1,2,2-Tetrafluoroethane (75-00-3)	9.8	0.010	0.000	0.100	0.120	1000	6,990,593
1,2-Dichloroethane (67-66-3)	9.8	0.005	0.000	0.052	0.066	1	4,047
Chloroform (74-87-3)	9.8	0.014	0.000	0.092	0.780	2	9,765
Tetrachloroethene (110-82-7)	9.6	0.392	0.000	0.091	88.171	25	169,560
Carbon Disulfide (64-17-5)	9.1	0.921	0.000	4.733	168.162	1	3,114
1,1,2-Trichloro-1,2,2-Trifluoroethane (100-41-4)	7.0	0.034	0.000	0.446	0.950	1000	7,663,804

Analyte (CASRN) ¹	% Det.	Mean Conc. (µg/m ³)	Median Conc. (µg/m ³)	95th percentile (µg/m ³)	Max Conc. (µg/m ³)	CAL/OSHA PEL	
						(ppm)	(µg/m ³)
Octane (50-00-0)	6.8	0.272	0.000	2.392	8.800	300	1,401,595
1,4-Dichlorobenzene (142-82-5)	6.5	0.001	0.000	0.018	0.045	10	61,767
Trichloroethene (110-54-3)	5.8	0.179	0.000	0.019	50.004	25	134,346
4-Methyl-2-Pentanone (1330-20-7)	2.8	0.319	0.000	0.000	94.220	50	204,826
2-Methylnaphthalene (75-09-2)	2.2	0.016	0.000	0.000	1.600	100	581,595
Chloroethane (91-20-3)	1.9	0.001	0.000	0.000	0.100	100	263,845
2-Hexanone (1330-20-7)	1.4	0.020	0.000	0.000	2.253	1	4,097
1,1,1-Trichloroethane (111-65-9)	1.2	0.000	0.000	0.000	0.049	350	1,909,611
1,3-Butadiene (109-66-0)	1.2	0.003	0.000	0.000	0.575	1	2,212
Bis(2-Ethylhexyl)phthalate (100-42-5)	0.9	0.068	0.000	0.000	7.200	0.3	5,000
1,1-Dichloroethane (127-18-4)	0.2	0.000	0.000	0.000	0.012	100	404,744
1,1,2,2-Tetrachloroethane (108-88-3)	0.2	0.000	0.000	0.000	0.080	1	6,865
Styrene (79-01-6)	0.2	0.005	0.000	0.000	2.172	50	212,986
1,1,2-Trichloroethane (75-69-4)	0.2	0.006	0.000	0.000	2.510	10	54,560

¹ The following compounds had available OEHHA 8-hr RELs: Formaldehyde (9 µg/m³); Acetaldehyde (300 µg/m³); Benzene (3 µg/m³) and 1,3-Butadiene (9 µg/m³). Mean (8-hr TWA) concentrations did not exceed any available 8-hr RELs.

² Cal/OSHA PEL (8-hr TWA) not available; ceiling limit is presented, which is a limit that may not be exceeded for any time.