

**Site Specific Conditional Sampler
Garfield County, Colorado**

Third Quarter 2018

Volatile Organic Compounds Data Summaries

Prepared for

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1.0 INTRODUCTION

In response to citizen concerns, Garfield County Public Health contracted with Air Resource Specialists, Inc. (ARS) to design and build a conditional sampler to collect canister samples near a newly developed well-pad operated by URSA Operating Company, LLC.

Figure 1-1 presents a map showing the general location of URSA operations and the monitoring location. Figures 1-2 and 1-3 show photographs of the sampling systems. This data submittal report summarizes Speciated Non-Methane Organic Compounds (SNMOC) measured at the URSA site.

Any questions regarding the content of this report or the accompanying digital data files should be addressed to:

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Figure 1-1. Map Showing General Location of the Sampling Area.



Figure 1-2. Upwind Conditional Sampler



Figure 1-3. Downwind Conditional Sampler



Figure 1-4. Example Summa Canister

2.0 SAMPLE COLLECTION AND ANALYSIS

Methodologies for the collection and analysis of Volatile Organic Compounds (VOC) at the URSA site specific conditional monitoring site meet EPA's *Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air*.

Speciated compounds are analyzed from samples collected using a SUMMA® stainless steel canister following EPA's Compendium Method TO-12, *Determination of Non-Methane Organic Compounds (NMOC) in Ambient Air Using Cryogenic Preconcentration and Direct Flame Ionization Detection (PDFID)*. Collected samples are sent to Eastern Research Group, Inc. (ERG) for analysis.

Two sampling systems collect ambient air samples when specific wind speed and direction conditions are present. The samplers operate when prevailing winds are from the southwest (215°- 235°), collecting upwind samples not likely associated with activities from the well pad using one system, and collecting downwind samples likely to be influenced by well pad activity using the other system.

For this study, each sample comprises at least a seven day period to ensure sufficient collection for VOC identification. Following exposure, samples were collected by Garfield County Public Health site operators and shipped directly to ERG for analysis. Chain-of-custody accounting is fully documented by shipping records, shipping logs, and field sampling log sheets, maintained by Garfield County Public Health. ERG performs sample analysis and data validation for samples per EPA method TO-12 requirements and provides validated data to ARS for inclusion in reports, data submittals and archives.

3.0 OPERATIONAL SUMMARY

The operational timelines for the canister samples for the reporting period are summarized in Table 3-1. The summaries include sampling times, site visits and significant events affecting data collection.

Table 3-1
Sampler Operational Timeline
July – September 2018

Month/Year	Upwind Canister Total Sampling Time	Downwind Canister Total Sampling Time
July 2018	Sample invalid due to leak	493 minutes
July 2018	783 minutes	389 minutes
August 16, 2018		Grab Sample
August 2018	787 minutes	978 minutes
September 2018	760 minutes	429 minutes

4.0 DATA SUMMARIES

Volatile organic compounds (VOCs) are carbon-based and hydrogen-based chemicals that exist in the gas phase or can evaporate from liquids. VOCs can react in the atmosphere to form ozone (O₃) and particulate matter. Hazardous air pollutants (HAPs) are a subset of VOC compounds, and include compounds that are known or believed to cause human health effects. Speciated Non-Methane Organic Compounds (SNMOC) are collected and analyzed according to EPA Compendium Method TO-12.

SNMOC compounds can be grouped into classifications with similar characteristics. For summary purposes, measured SNMOC compounds are grouped into the following categories:

- **Light Alkanes:** Alkanes are the simplest hydrocarbons, consisting of only carbon and hydrogen with single bonds. Light alkanes, which include alkanes with up to five carbon atoms (ethane, propane, iso/n-butane and iso/n-pentane), along with methane, are primary components of natural gas and gasoline vapors.
- **Heavy Alkanes:** The hydrocarbons in crude oil are mostly heavy alkanes, which here include alkanes with more than five carbon atoms (C₅). Crude oil products include gasoline, a refined mix of predominantly C₆ to C₁₀ hydrocarbons, and diesel, which is a refined mix ranging from approximately C₁₀ to C₁₅.
- **Alkenes:** Alkenes are more complex than alkanes, with at least one carbon to carbon double bond. These compounds are not generally found in crude oil. Alkenes are much more reactive than alkanes, and will deplete quickly in the atmosphere. Alkenes are produced in refineries when larger alkane molecules are dissociated (or cracked) into smaller compounds. Some alkene compounds, including terpenes such as isoprene and a- and b-pinene, are naturally emitted from vegetation.
- **Aromatics:** Aromatic compounds are the most abundant compounds emitted from gas-fired engines. These compounds include the BTEX parameters (benzene, toluene, ethylbenzene, and m/p-xylenes), which are commonly associated with motor vehicles, and other engine sources such as those associated with oil and gas production.

Figure 4-1 presents measured SNMOC compounds collected from the site specific conditional sampler during each week long sampling event. Associated meteorological data are presented in Figures 4-2 through 4-7 as timeline series plots. Figures 4-8 through 4-13 present monthly wind roses associated with each conditional sampling period.

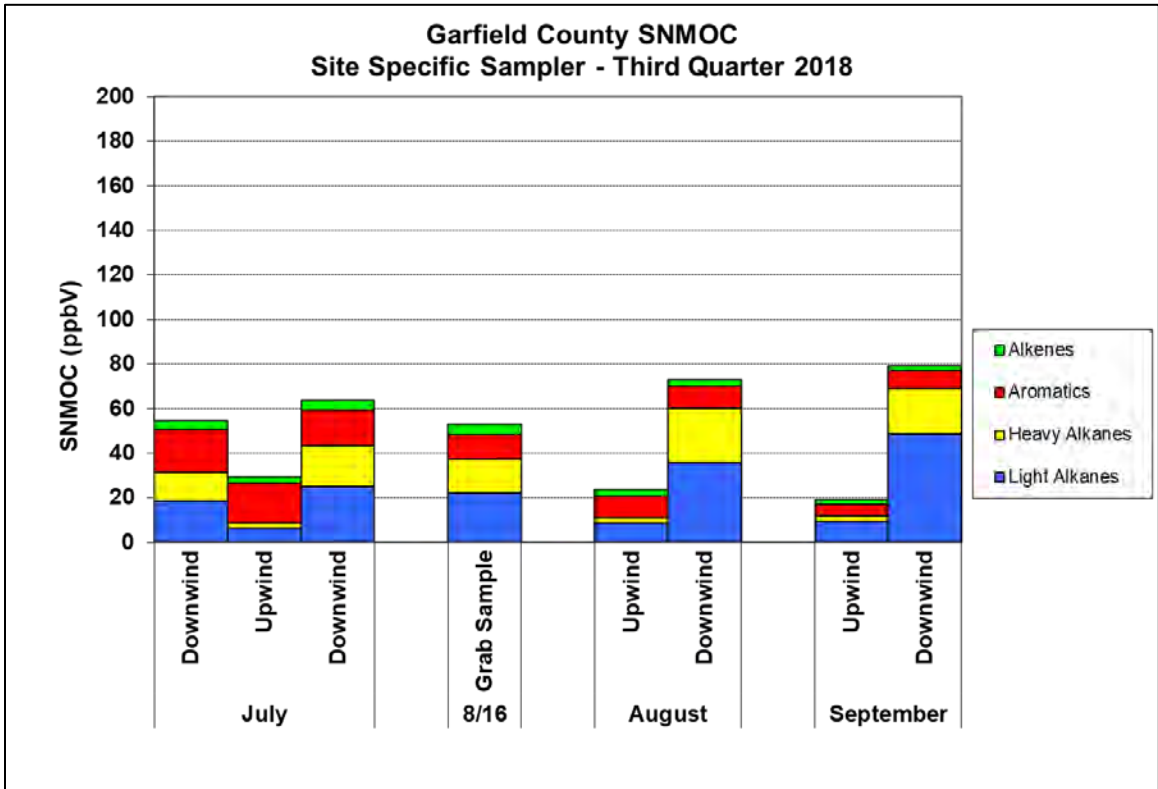


Figure 4-1. Measured SNMOC Concentrations Site Specific Conditional Sampler

Figure 4-2
Upwind Sampler
Garfield County - Meteorological Data
July 2018

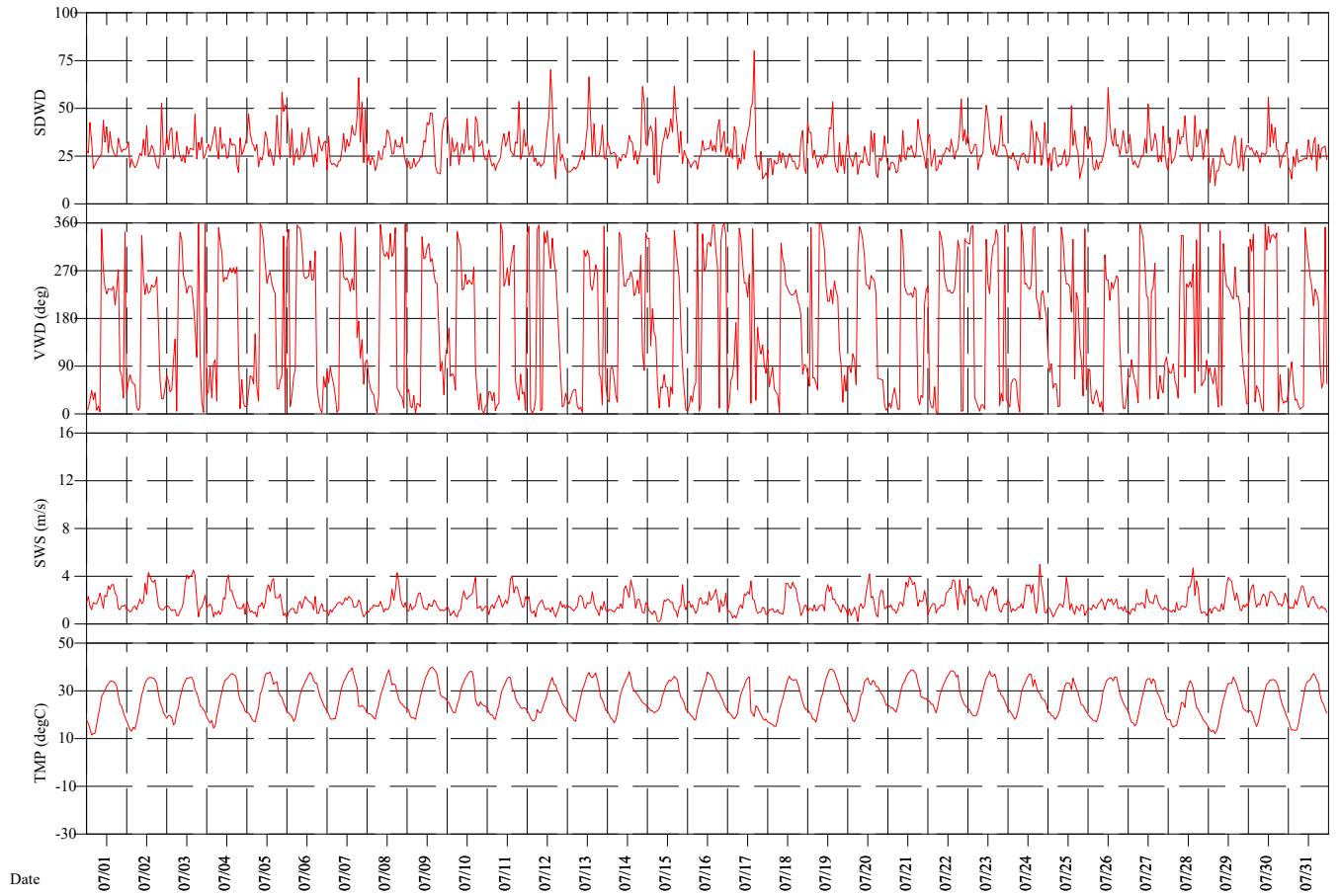


Figure 4-3
Downwind Sampler
Garfield County - Meteorological Data
July 2018

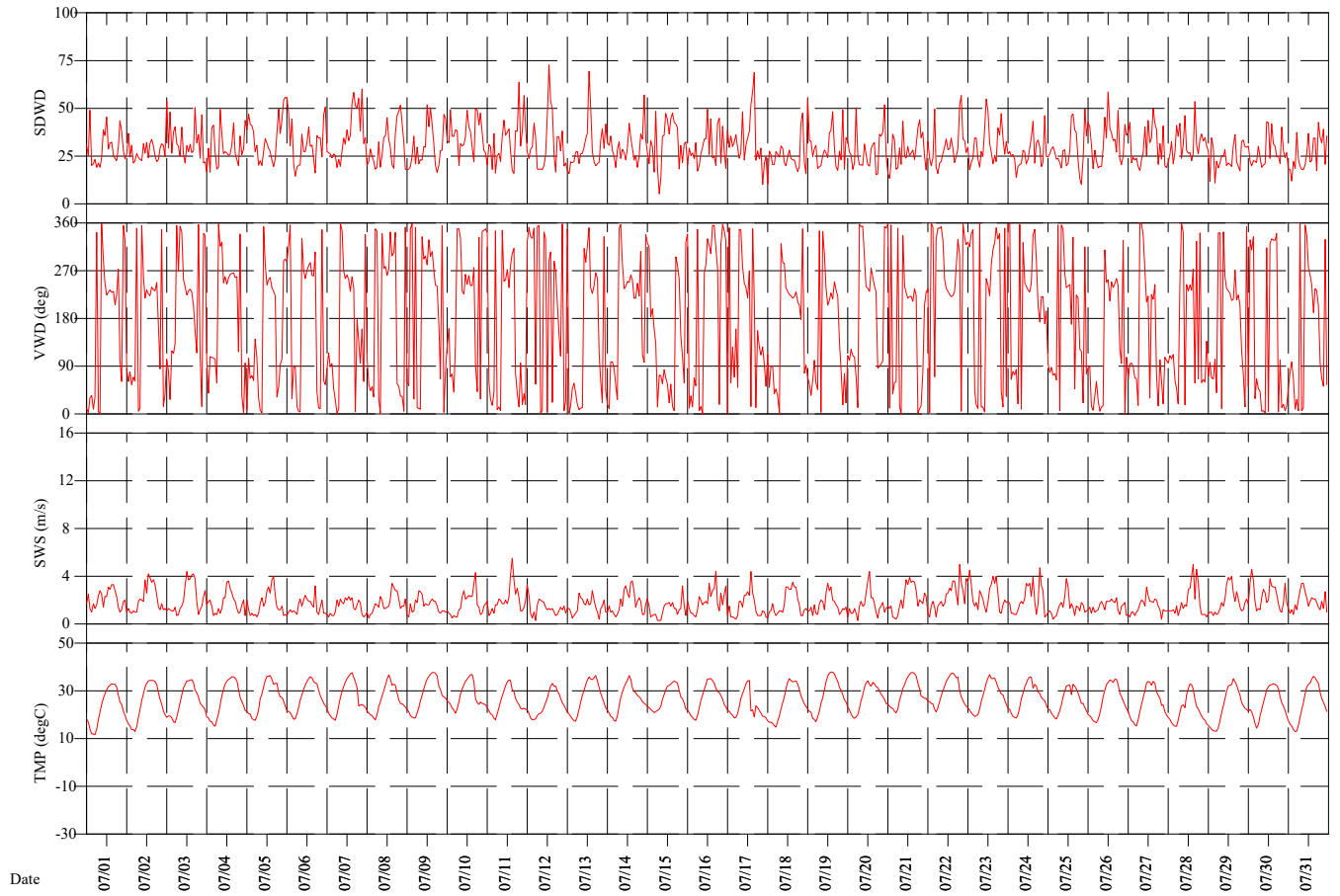


Figure 4-4
Upwind Sampler
Garfield County - Meteorological Data
August 2018

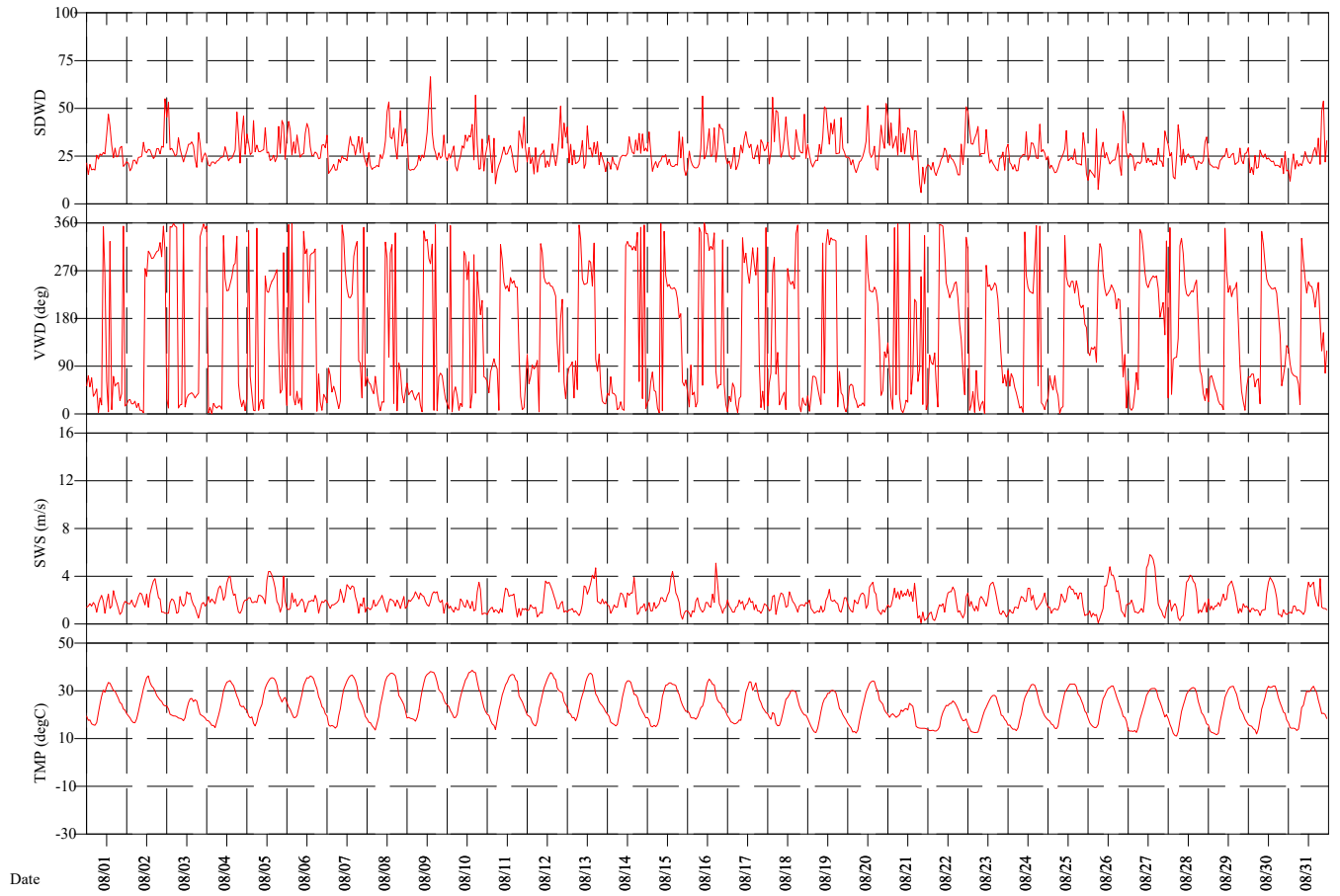


Figure 4-5
Downwind Sampler
Garfield County - Meteorological Data
August 2018

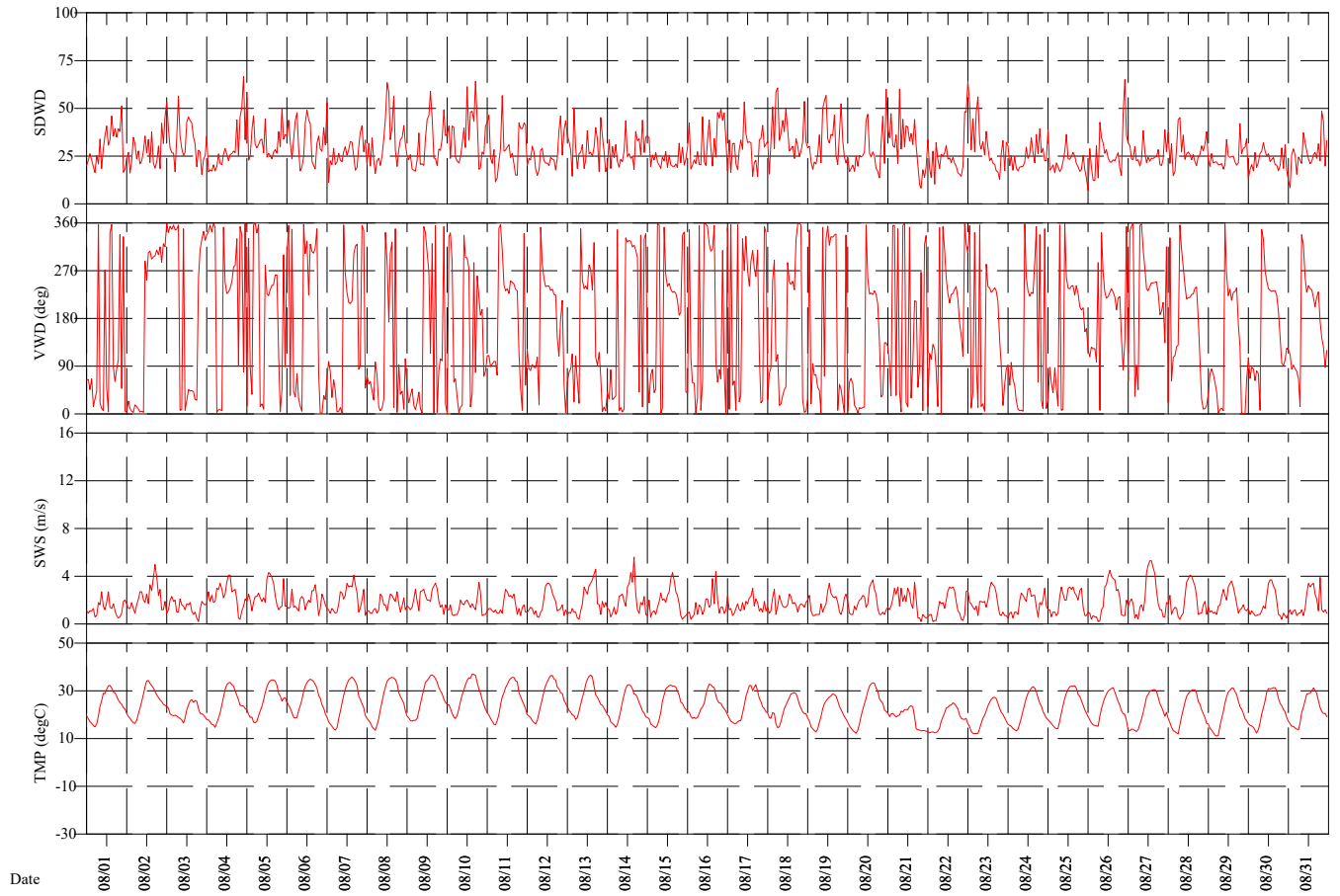


Figure 4-6
Upwind Sampler
Garfield County - Meteorological Data
September 2018

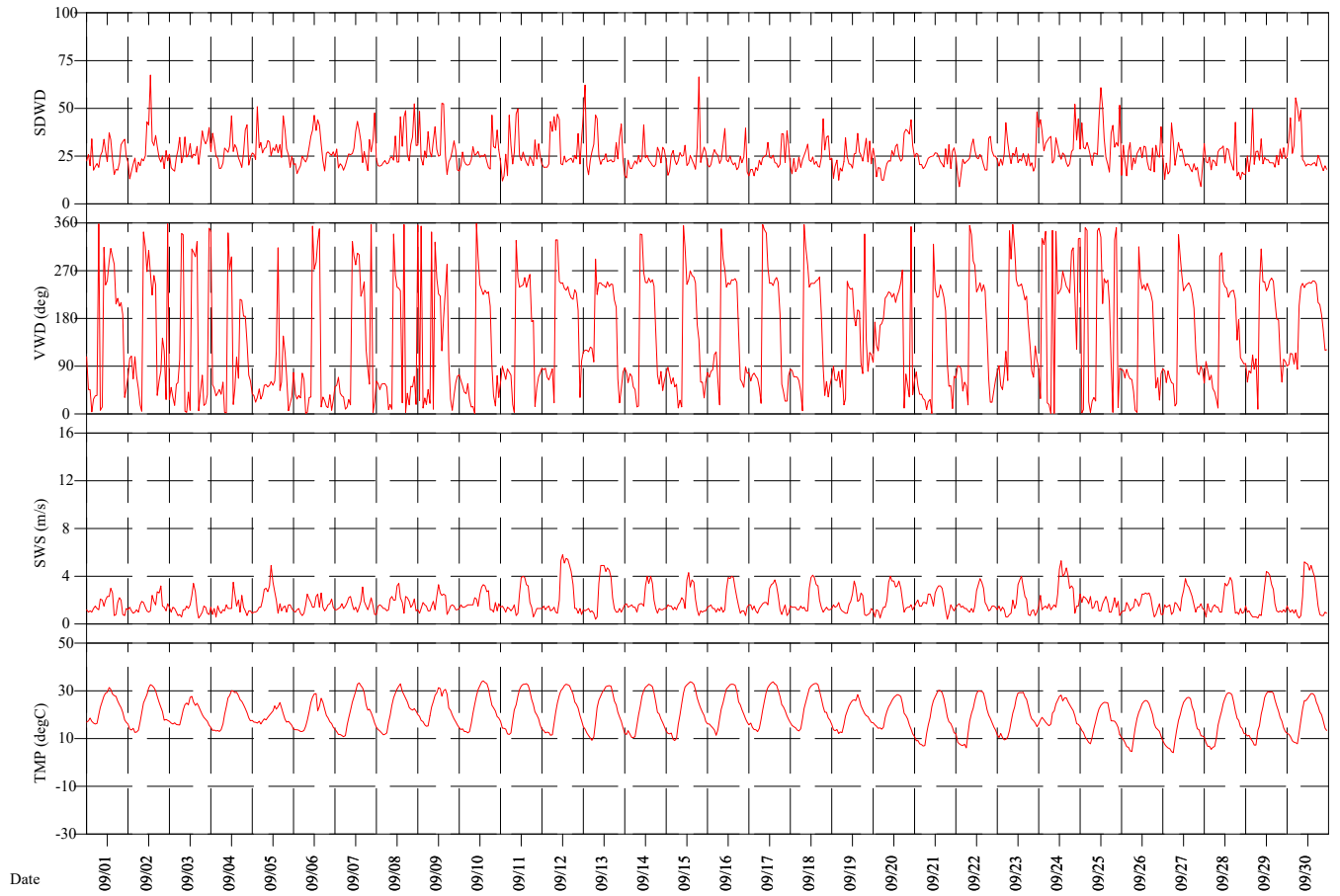
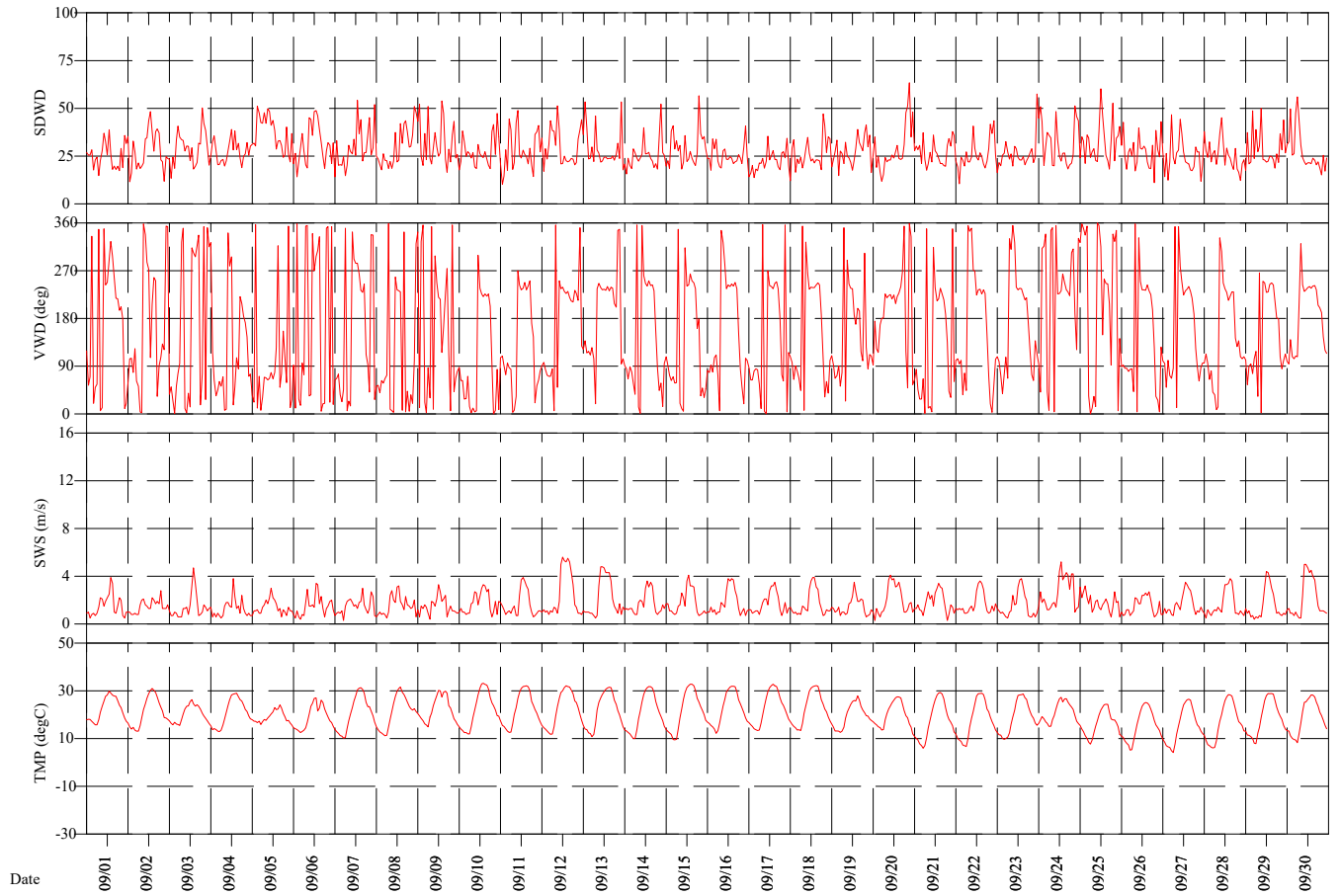


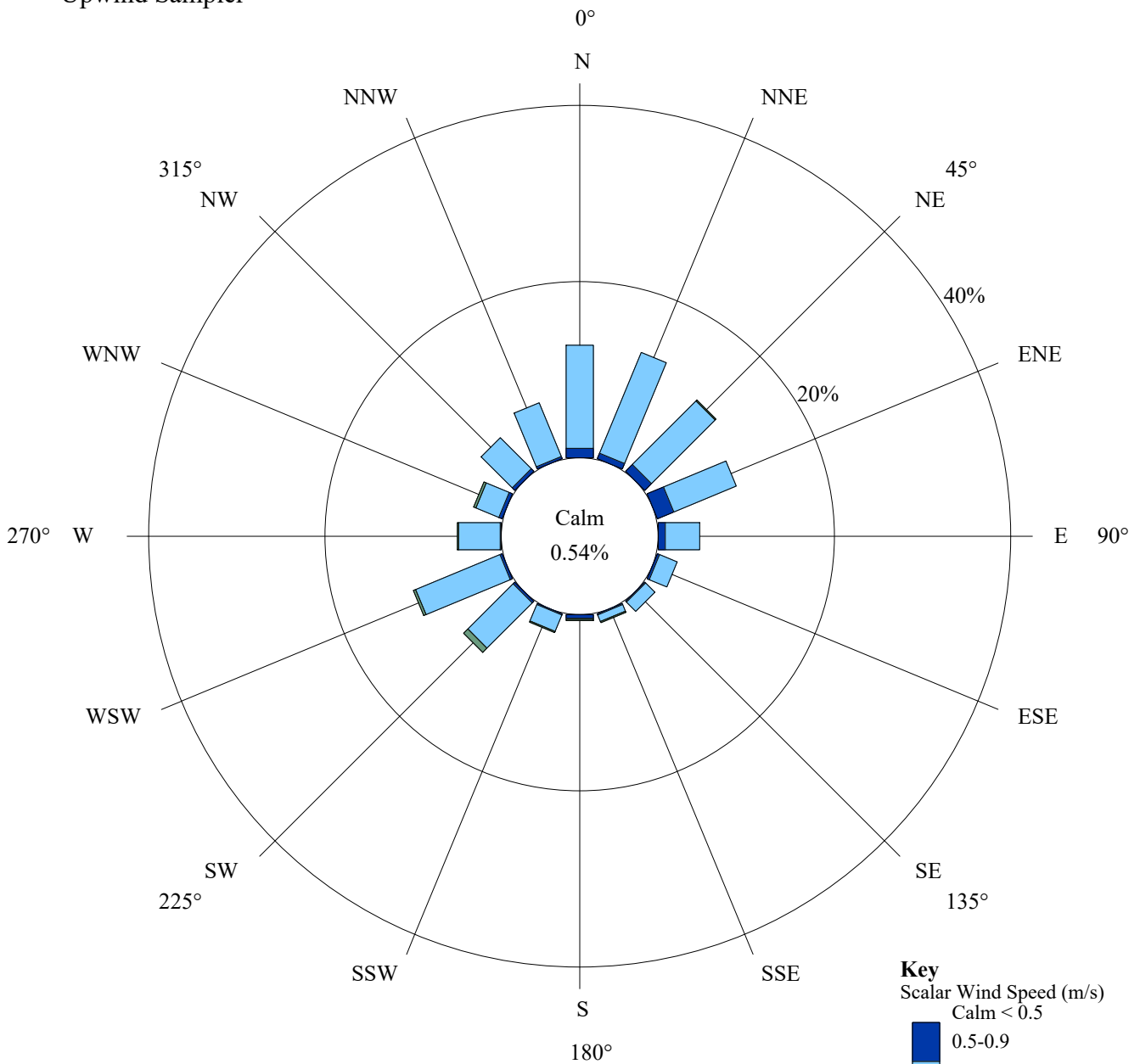
Figure 4-7
Downwind Sampler
Garfield County - Meteorological Data
September 2018



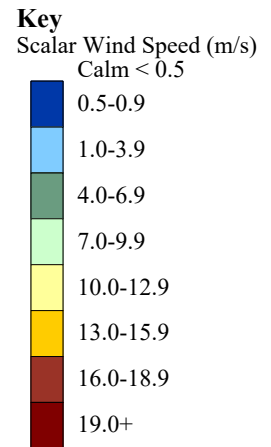
Garfield County Colorado
Upwind Sampler

Figure 4-8
Wind Rose

07/01/2018 - 07/31/2018



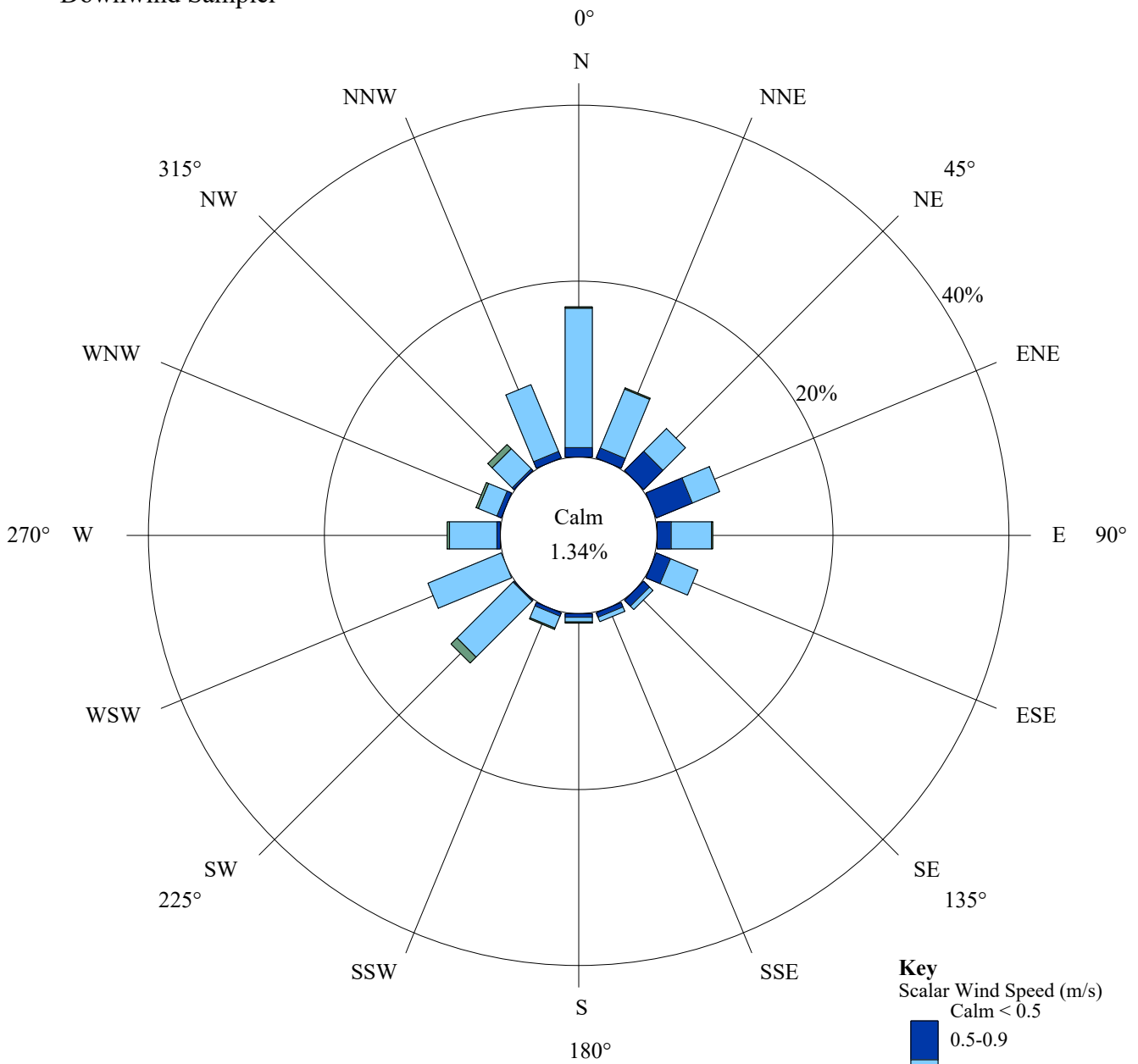
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744 Possible /744 Collected /744 Valid
Collection Statistics Include:
Wind Speed and Wind Direction
(SWS-1; VWD-1)



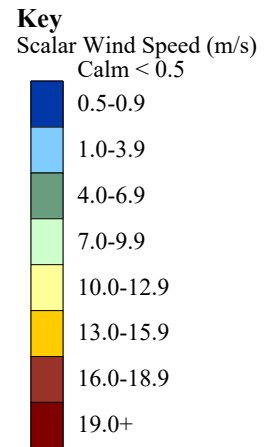
Garfield County Colorado
Downwind Sampler

Figure 4-9
Wind Rose

07/01/2018 - 07/31/2018



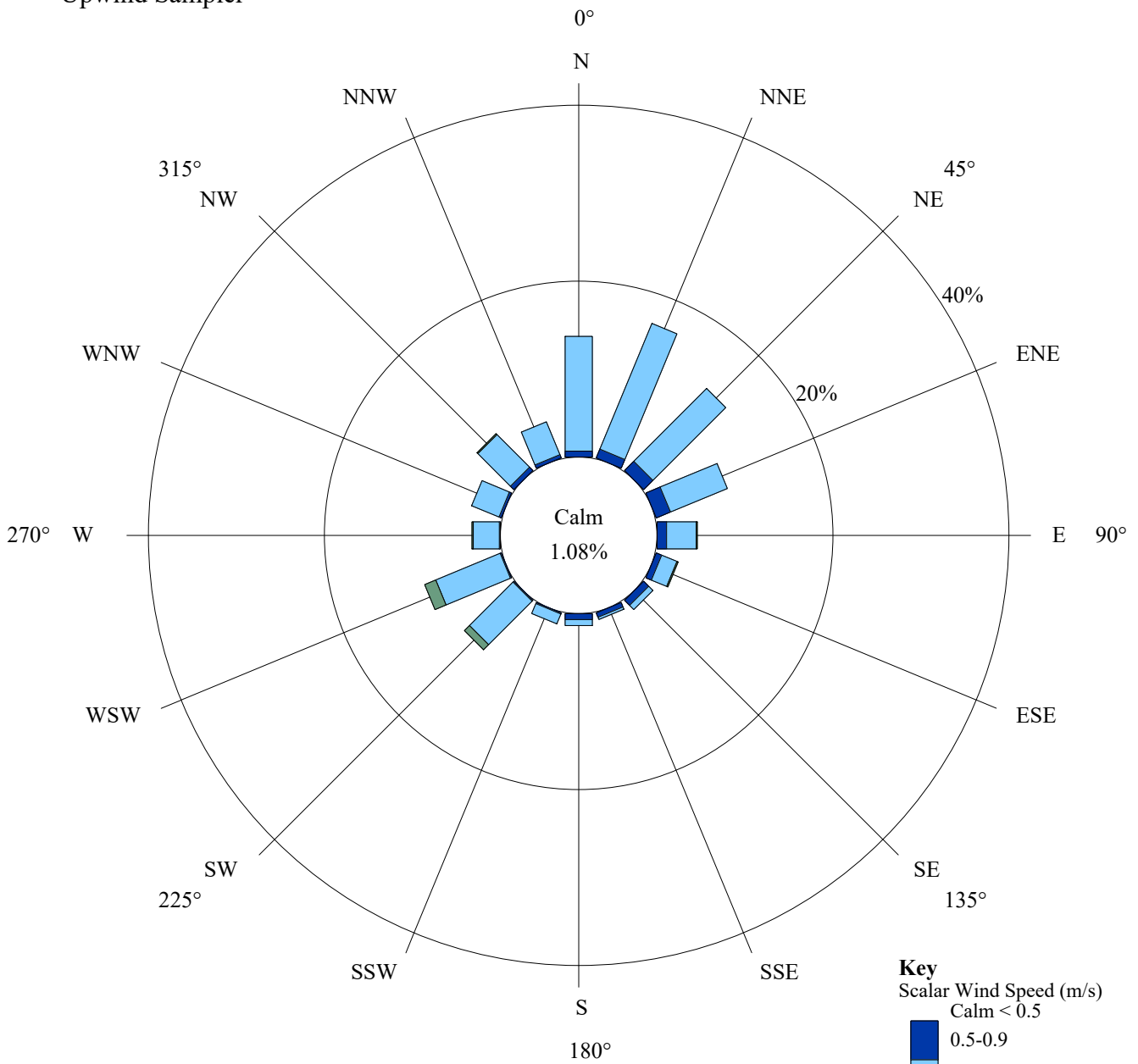
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744 Possible /744 Collected /744 Valid
Collection Statistics Include:
Wind Speed and Wind Direction
(SWS-1; VWD-1)



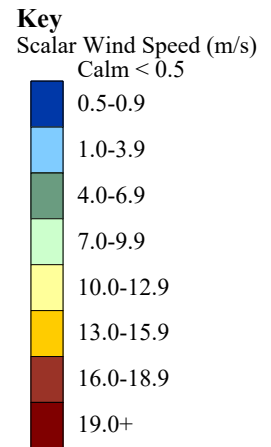
Garfield County Colorado
Upwind Sampler

Figure 4-10
Wind Rose

08/01/2018 - 08/31/2018



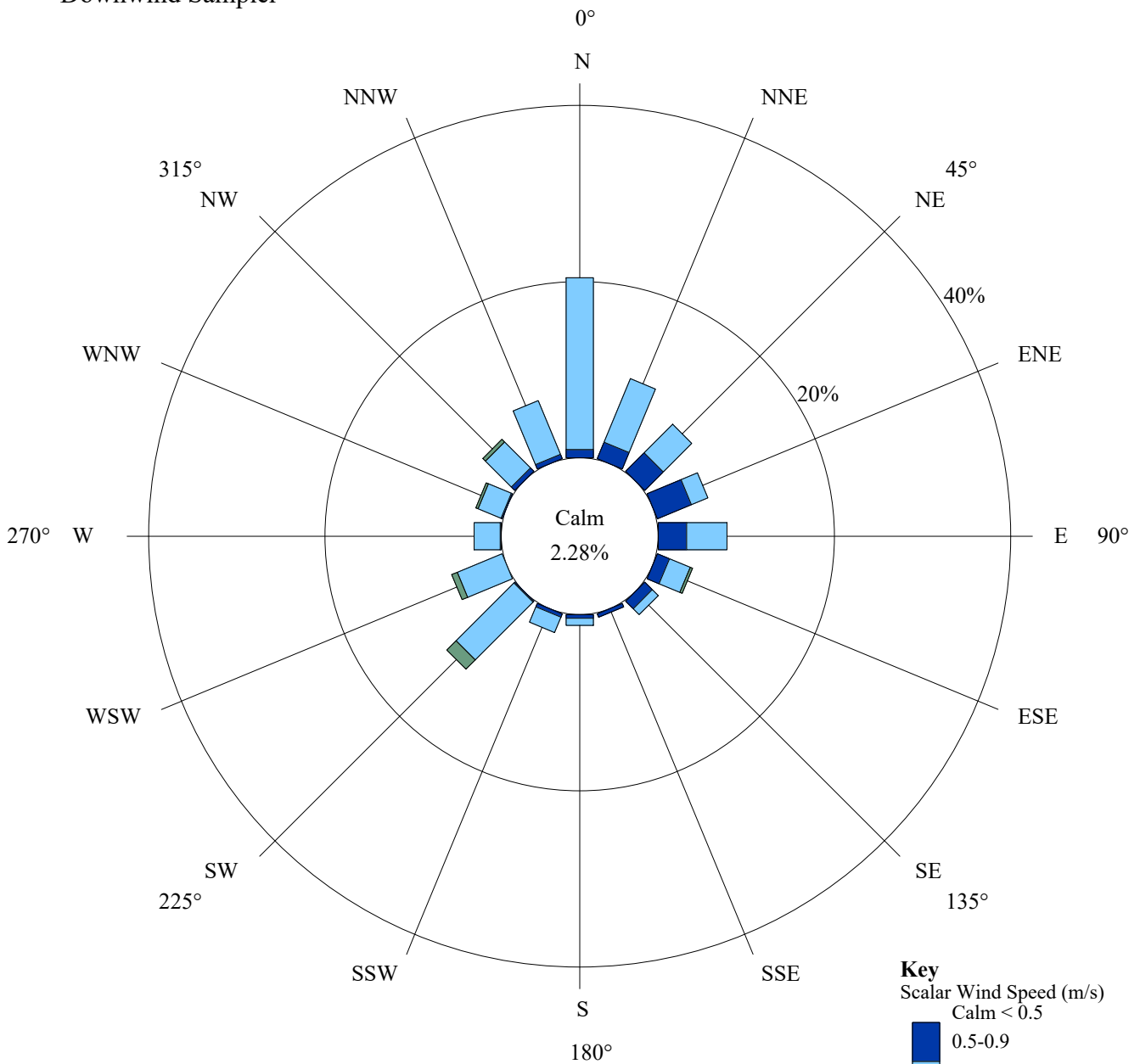
100.0% Collected 100.0% Valid
744 Possible /744 Collected /744 Valid
Collection Statistics Include:
Wind Speed and Wind Direction
(SWS-1; VWD-1)



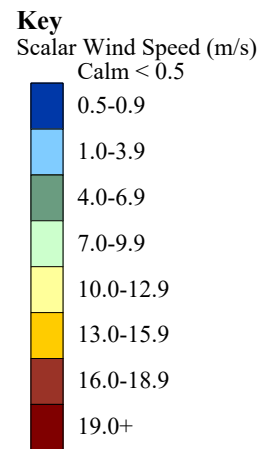
Garfield County Colorado
Downwind Sampler

Figure 4-11
Wind Rose

08/01/2018 - 08/31/2018



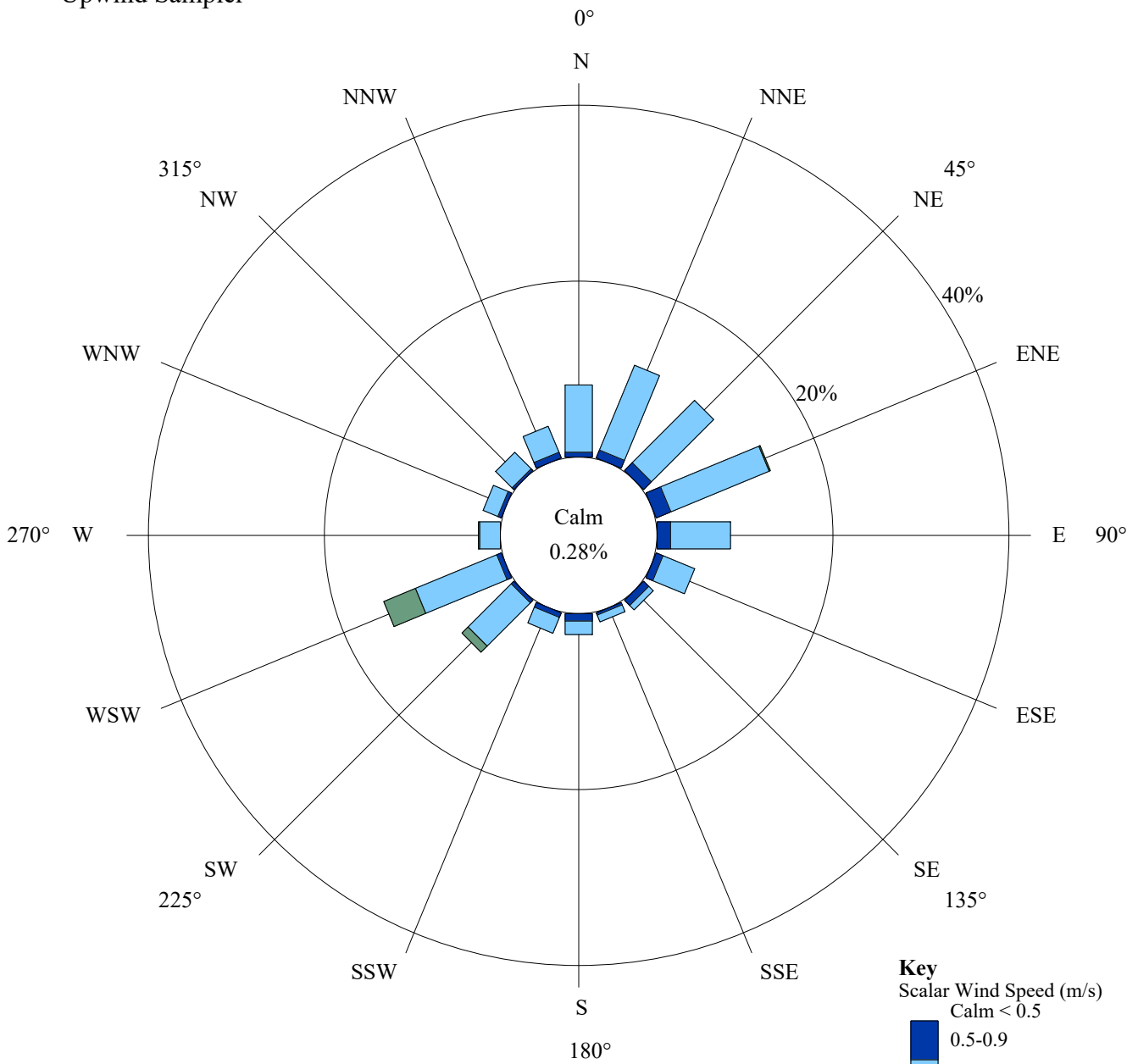
100.0% Collected 100.0% Valid
744 Possible /744 Collected /744 Valid
Collection Statistics Include:
Wind Speed and Wind Direction
(SWS-1; VWD-1)



Garfield County Colorado
Upwind Sampler

Figure 4-12
Wind Rose

09/01/2018 - 09/30/2018



100.0% Collected 100.0% Valid
720 Possible /720 Collected /720 Valid
Collection Statistics Include:
Wind Speed and Wind Direction
(SWS-1; VWD-1)

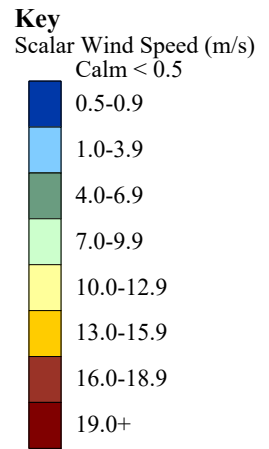
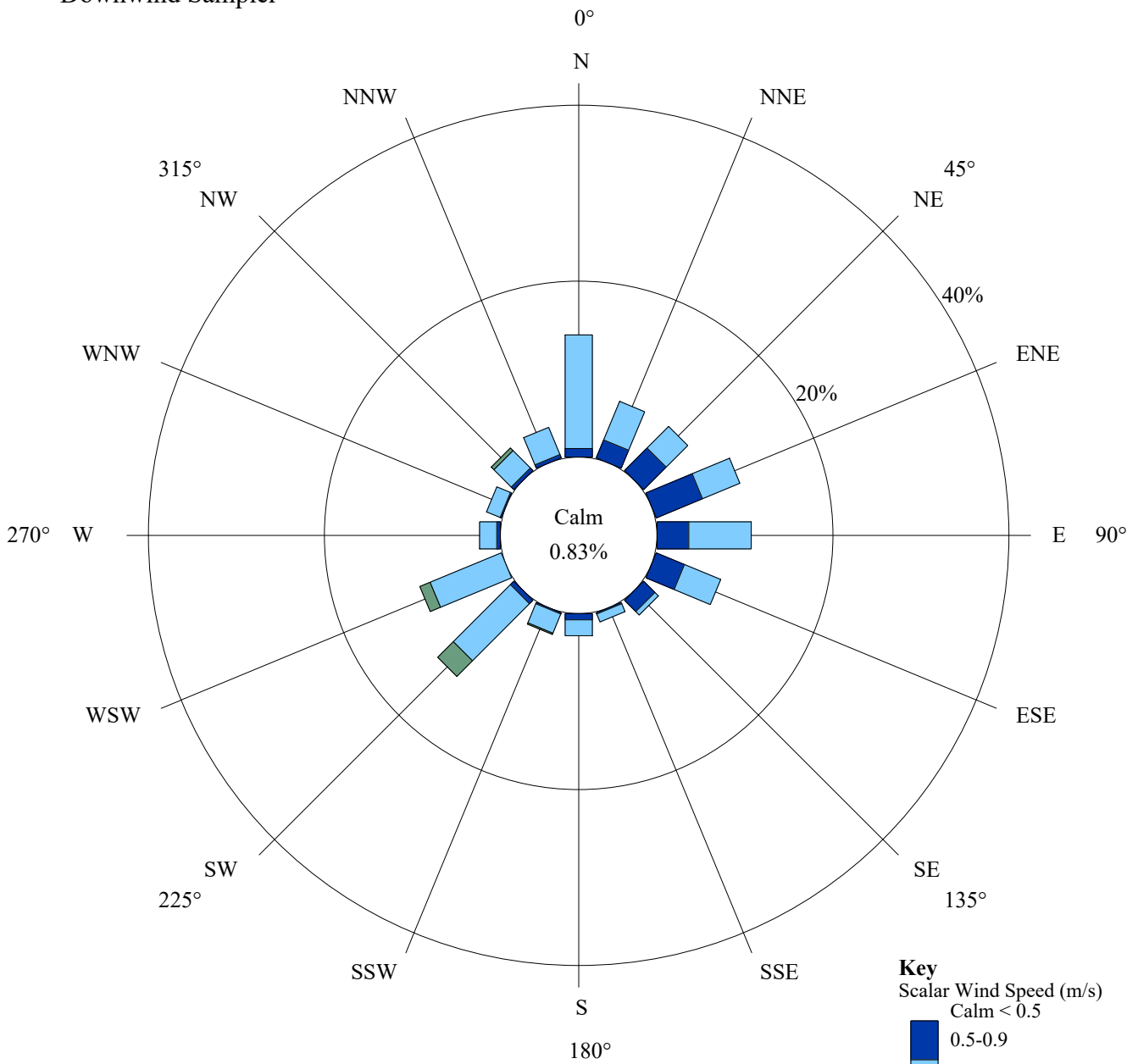


Figure 4-13

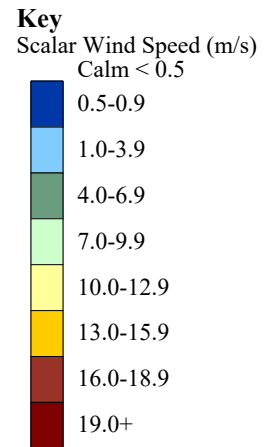
Garfield County Colorado
Downwind Sampler

Wind Rose

09/01/2018 - 09/30/2018



100.0% Collected 100.0% Valid
720 Possible /720 Collected /720 Valid
Collection Statistics Include:
Wind Speed and Wind Direction
(SWS-1; VWD-1)



Appendix A

**URSA Pad
Site Specific Conditional Sampler
Garfield County, Colorado**

Speciated VOC Concentrations

Garfield County - URSA Pad Site Specific Conditional Sampler
 July 2018
 Upwind Canister

Detected Compound	Concentration (ppbV)	Comments
1,2,3-Trimethylbenzene	0.20222	
1,2,4-Trimethylbenzene	0.14000	
1,3,5-Trimethylbenzene	0.04511	
1,3-Butadiene	ND	U
1-Butene	ND	CE, U
1-Dodecene	ND	U
1-Heptene	ND	U
1-Hexene	ND	CE, U
1-Nonene	0.06044	
1-Octene	0.09025	
1-Pentene	0.07060	
1-Tridecene	ND	U
1-Undecene	ND	U
2,2,3-Trimethylpentane	ND	U
2,2,4-Trimethylpentane	ND	U
2,2-Dimethylbutane	ND	U
2,3,4-Trimethylpentane	ND	U
2,3-Dimethylbutane	0.01917	
2,3-Dimethylpentane	ND	U
2,4-Dimethylpentane	0.02100	
2-Ethyl-1-butene	ND	U
2-Methyl-1-butene	0.03380	
2-Methyl-1-pentene	ND	CE, U
2-Methyl-2-butene	ND	U
2-Methylheptane	ND	U
2-Methylhexane	ND	U
2-Methylpentane	ND	CE, U
3-Methyl-1-butene	ND	U
3-Methylheptane	0.05175	
3-Methylhexane	0.14857	
3-Methylpentane	0.07517	
4-Methyl-1-pentene	0.01483	
Acetylene	0.09050	
a-Pinene	ND	U
Benzene	0.50000	
b-Pinene	ND	U
cis-2-Butene	0.01475	
cis-2-Hexene	0.01783	
cis-2-Pentene	ND	CE, U
Cyclohexane	0.19667	
Cyclopentane	0.01580	

CE = Not reportable due to co-eluting compound

U = Under detection limit

Garfield County - URSA Pad Site Specific Conditional Sampler
 July 2018
 Upwind Canister

Detected Compound	Concentration (ppbV)	Comments
Cyclopentene	ND	CE, U
Ethane	3.96500	
Ethylbenzene	0.02125	
Ethylene	1.64000	
Isobutane	0.26500	
Isobutylene	ND	CE, U
Isopentane	ND	CE, U
Isoprene	0.52200	
Isopropylbenzene	ND	U
m-Diethylbenzene	ND	U
Methylcyclohexane	0.31714	
Methylcyclopentane	0.10050	
m-Ethyltoluene	0.15556	
m-Xylene/p-Xylene	0.25500	
n-Butane	0.38000	
n-Decane	0.15700	
n-Dodecane	ND	U
n-Heptane	0.16857	
n-Hexane	0.49167	
n-Nonane	0.17000	
n-Octane	0.23500	
n-Pentane	0.24400	
n-Propylbenzene	0.07822	
n-Tridecane	ND	U
n-Undecane	0.18636	
o-Ethyltoluene	ND	U
o-Xylene	0.09238	
p-Diethylbenzene	ND	U
p-Ethyltoluene	0.02700	
Propane	1.26667	
Propylene	0.46333	
Propyne	ND	U
Styrene	ND	U
Toluene	16.42857	
trans-2-Butene	ND	U
trans-2-Hexene	ND	U
trans-2-Pentene	0.02300	

CE = Not reportable due to co-eluting compound

U = Under detection limit

Garfield County - URSA Pad Site Specific Conditional Sampler
 July 2018
 Downwind Canister

Detected Compound	Concentration (ppbV)	Comments
1,2,3-Trimethylbenzene	0.16000	
1,2,4-Trimethylbenzene	0.44222	
1,3,5-Trimethylbenzene	0.33667	
1,3-Butadiene	0.02950	U
1-Butene	ND	CE, U
1-Dodecene	ND	U
1-Heptene	ND	CE, U
1-Hexene	ND	CE, U
1-Nonene	0.08211	
1-Octene	0.19000	
1-Pentene	0.09700	
1-Tridecene	0.04500	
1-Undecene	ND	U
2,2,3-Trimethylpentane	ND	U
2,2,4-Trimethylpentane	ND	CE, U
2,2-Dimethylbutane	0.06050	
2,3,4-Trimethylpentane	ND	U
2,3-Dimethylbutane	0.10333	
2,3-Dimethylpentane	0.11729	
2,4-Dimethylpentane	0.07186	
2-Ethyl-1-butene	ND	U
2-Methyl-1-butene	ND	CE, U
2-Methyl-1-pentene	ND	U
2-Methyl-2-butene	ND	CE, U
2-Methylheptane	0.44000	
2-Methylhexane	0.39429	
2-Methylpentane	0.58833	
3-Methyl-1-butene	0.01540	U
3-Methylheptane	0.36250	
3-Methylhexane	0.38857	
3-Methylpentane	0.29000	
4-Methyl-1-pentene	ND	U
Acetylene	0.14750	
a-Pinene	ND	U
Benzene	1.15000	
b-Pinene	ND	U
cis-2-Butene	0.02550	
cis-2-Hexene	ND	U
cis-2-Pentene	ND	U
Cyclohexane	0.94333	
Cyclopentane	0.06060	

CE = Not reportable due to co-eluting compound

U = Under detection limit

Garfield County - URSA Pad Site Specific Conditional Sampler
 July 2018
 Downwind Canister

Detected Compound	Concentration (ppbV)	Comments
Cyclopentene	ND	CE, U
Ethane	12.10000	
Ethylbenzene	0.14000	
Ethylene	2.12500	
Isobutane	0.90250	
Isobutylene	ND	CE, U
Isopentane	ND	CE, U
Isoprene	0.58800	
Isopropylbenzene	ND	U
m-Diethylbenzene	ND	U
Methylcyclohexane	2.34286	
Methylcyclopentane	0.48000	
m-Ethyltoluene	0.40778	
m-Xylene/p-Xylene	1.30000	
n-Butane	1.11250	
n-Decane	0.92000	
n-Dodecane	0.19083	
n-Heptane	0.95714	
n-Hexane	0.86500	
n-Nonane	1.14444	
n-Octane	1.42500	
n-Pentane	0.71600	
n-Propylbenzene	ND	U
n-Tridecane	0.04685	
n-Undecane	0.62273	
o-Ethyltoluene	ND	U
o-Xylene	0.30250	
p-Diethylbenzene	ND	U
p-Ethyltoluene	0.13667	
Propane	3.56667	
Propylene	0.78667	
Propyne	ND	U
Styrene	ND	CE, U
Toluene	14.57143	
trans-2-Butene	0.05800	
trans-2-Hexene	ND	U
trans-2-Pentene	0.04080	

CE = Not reportable due to co-eluting compound

U = Under detection limit

Garfield County - URSA Pad Site Specific Conditional Sampler
 July 2018
 Downwind Canister

Detected Compound	Concentration (ppbV)	Comments
1,2,3-Trimethylbenzene	0.15444	
1,2,4-Trimethylbenzene	0.40556	
1,3,5-Trimethylbenzene	0.30556	
1,3-Butadiene	0.02975	U
1-Butene	ND	CE, U
1-Dodecene	ND	U
1-Heptene	ND	CE, U
1-Hexene	ND	CE, U
1-Nonene	0.07789	
1-Octene	0.21500	
1-Pentene	0.09240	
1-Tridecene	ND	U
1-Undecene	ND	U
2,2,3-Trimethylpentane	ND	U
2,2,4-Trimethylpentane	ND	CE, U
2,2-Dimethylbutane	0.08550	
2,3,4-Trimethylpentane	ND	U
2,3-Dimethylbutane	0.15183	
2,3-Dimethylpentane	0.17429	
2,4-Dimethylpentane	0.11400	
2-Ethyl-1-butene	ND	U
2-Methyl-1-butene	ND	U
2-Methyl-1-pentene	ND	CE, U
2-Methyl-2-butene	0.06060	
2-Methylheptane	0.68250	
2-Methylhexane	0.63714	
2-Methylpentane	0.90167	
3-Methyl-1-butene	ND	U
3-Methylheptane	0.56000	
3-Methylhexane	0.64286	
3-Methylpentane	0.45000	
4-Methyl-1-pentene	ND	U
Acetylene	0.18200	
a-Pinene	ND	U
Benzene	1.34000	A-01
b-Pinene	ND	U
cis-2-Butene	0.02175	
cis-2-Hexene	ND	U
cis-2-Pentene	ND	U
Cyclohexane	1.34667	
Cyclopentane	0.09280	

CE = Not reportable due to co-eluting compound

U = Under detection limit

Garfield County - URSA Pad Site Specific Conditional Sampler
 July 2018
 Downwind Canister

Detected Compound	Concentration (ppbV)	Comments
Cyclopentene	ND	CE, U
Ethane	16.20000	
Ethylbenzene	0.16250	
Ethylene	2.19500	
Isobutane	1.23500	
Isobutylene	ND	CE, U
Isopentane	ND	CE, U
Isoprene	0.56600	
Isopropylbenzene	ND	U
m-Diethylbenzene	ND	U
Methylcyclohexane	3.85714	
Methylcyclopentane	0.79167	
m-Ethyltoluene	ND	U
m-Xylene/p-Xylene	1.58750	
n-Butane	1.51250	
n-Decane	0.97900	
n-Dodecane	0.22500	
n-Heptane	1.51429	
n-Hexane	1.33667	
n-Nonane	1.58889	
n-Octane	2.13750	
n-Pentane	1.03200	
n-Propylbenzene	0.07078	
n-Tridecane	ND	U
n-Undecane	0.49818	
o-Ethyltoluene	ND	U
o-Xylene	0.34375	
p-Diethylbenzene	ND	U
p-Ethyltoluene	ND	U
Propane	4.70000	
Propylene	0.89000	
Propyne	ND	U
Styrene	ND	CE, U
Toluene	11.38571	
trans-2-Butene	0.05125	
trans-2-Hexene	ND	U
trans-2-Pentene	0.05340	

CE = Not reportable due to co-eluting compound

U = Under detection limit

Garfield County - URSA Pad Site Specific Conditional Sampler
 August 2018
 Upwind Canister

Detected Compound	Concentration (ppbV)	Comments
1,2,3-Trimethylbenzene	0.02011	
1,2,4-Trimethylbenzene	0.07922	
1,3,5-Trimethylbenzene	0.03056	
1,3-Butadiene	ND	U
1-Butene	ND	CE, U
1-Dodecene	ND	U
1-Heptene	ND	CE, U
1-Hexene	ND	CE, U
1-Nonene	0.04033	
1-Octene	0.07800	
1-Pentene	0.09960	
1-Tridecene	ND	U
1-Undecene	0.01864	U
2,2,3-Trimethylpentane	ND	U
2,2,4-Trimethylpentane	ND	CE, U
2,2-Dimethylbutane	0.01717	
2,3,4-Trimethylpentane	ND	CE, U
2,3-Dimethylbutane	0.03533	
2,3-Dimethylpentane	0.03200	
2,4-Dimethylpentane	0.02357	
2-Ethyl-1-butene	ND	U
2-Methyl-1-butene	0.03080	
2-Methyl-1-pentene	ND	CE, U
2-Methyl-2-butene	ND	U
2-Methylheptane	ND	CE, U
2-Methylhexane	0.09471	
2-Methylpentane	ND	U
3-Methyl-1-butene	ND	U
3-Methylheptane	0.07225	
3-Methylhexane	0.16714	
3-Methylpentane	0.10683	
4-Methyl-1-pentene	ND	U
Acetylene	0.11550	
a-Pinene	ND	U
Benzene	0.30667	
b-Pinene	ND	U
cis-2-Butene	0.02275	
cis-2-Hexene	ND	U
cis-2-Pentene	ND	U
Cyclohexane	0.26333	
Cyclopentane	0.02540	

CE = Not reportable due to co-eluting compound

U = Under detection limit

Garfield County - URSA Pad Site Specific Conditional Sampler
 August 2018
 Upwind Canister

Detected Compound	Concentration (ppbV)	Comments
Cyclopentene	ND	CE, U
Ethane	5.65000	
Ethylbenzene	0.02525	
Ethylene	2.06000	
Isobutane	0.38750	
Isobutylene	ND	CE, U
Isopentane	ND	CE, U
Isoprene	0.27800	
Isopropylbenzene	0.08400	
m-Diethylbenzene	0.67000	
Methylcyclohexane	0.58286	
Methylcyclopentane	0.17333	
m-Ethyltoluene	ND	U
m-Xylene/p-Xylene	0.17750	
n-Butane	0.47750	
n-Decane	0.07850	
n-Dodecane	0.01333	U
n-Heptane	0.25714	
n-Hexane	0.36500	
n-Nonane	0.12222	
n-Octane	0.27750	
n-Pentane	0.28800	
n-Propylbenzene	0.02711	
n-Tridecane	ND	U
n-Undecane	0.03655	
o-Ethyltoluene	ND	U
o-Xylene	0.05600	
p-Diethylbenzene	ND	U
p-Ethyltoluene	ND	U
Propane	1.65667	
Propylene	0.62000	
Propyne	ND	U
Styrene	ND	U
Toluene	7.75714	
trans-2-Butene	ND	U
trans-2-Hexene	ND	U
trans-2-Pentene	0.0242	

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Garfield County - URSA Pad Site Specific Conditional Sampler
 August 2018
 Downwind Canister

Detected Compound	Concentration (ppbV)	Comments
1,2,3-Trimethylbenzene	0.10144	
1,2,4-Trimethylbenzene	0.43111	
1,3,5-Trimethylbenzene	0.48333	
1,3-Butadiene	0.01225	U
1-Butene	ND	CE, U
1-Dodecene	ND	U
1-Heptene	ND	CE, U
1-Hexene	ND	CE, U
1-Nonene	0.11778	
1-Octene	0.26500	
1-Pentene	0.08940	
1-Tridecene	ND	U
1-Undecene	ND	U
2,2,3-Trimethylpentane	ND	U
2,2,4-Trimethylpentane	ND	CE, U
2,2-Dimethylbutane	0.11933	
2,3,4-Trimethylpentane	ND	CE, U
2,3-Dimethylbutane	0.20833	
2,3-Dimethylpentane	0.22714	
2,4-Dimethylpentane	0.13743	
2-Ethyl-1-butene	ND	U
2-Methyl-1-butene	0.02640	
2-Methyl-1-pentene	ND	CE, U
2-Methyl-2-butene	0.04360	U
2-Methylheptane	0.96500	
2-Methylhexane	0.86857	
2-Methylpentane	1.02667	
3-Methyl-1-butene	ND	U
3-Methylheptane	0.79125	
3-Methylhexane	0.82571	
3-Methylpentane	0.55500	
4-Methyl-1-pentene	ND	U
Acetylene	0.13500	
a-Pinene	ND	U
Benzene	0.93000	
b-Pinene	ND	U
cis-2-Butene	0.01975	
cis-2-Hexene	ND	U
cis-2-Pentene	ND	U
Cyclohexane	1.68333	
Cyclopentane	0.10900	

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Garfield County - URSA Pad Site Specific Conditional Sampler
 August 2018
 Downwind Canister

Detected Compound	Concentration (ppbV)	Comments
Cyclopentene	ND	CE, U
Ethane	24.05000	
Ethylbenzene	0.18500	
Ethylene	1.61500	
Isobutane	1.74000	
Isobutylene	ND	CE, U
Isopentane	ND	CE, U
Isoprene	0.32600	
Isopropylbenzene	ND	U
m-Diethylbenzene	ND	U
Methylcyclohexane	5.38571	
Methylcyclopentane	0.99167	
m-Ethyltoluene	0.27111	
m-Xylene/p-Xylene	2.35000	
n-Butane	1.92500	
n-Decane	1.22000	
n-Dodecane	0.09000	
n-Heptane	2.10000	
n-Hexane	1.59000	
n-Nonane	2.00000	
n-Octane	3.02500	
n-Pentane	1.16000	
n-Propylbenzene	ND	U
n-Tridecane	ND	U
n-Undecane	0.43818	
o-Ethyltoluene	ND	U
o-Xylene	0.34250	
p-Diethylbenzene	ND	U
p-Ethyltoluene	ND	U
Propane	6.66667	
Propylene	0.43667	
Propyne	ND	U
Styrene	ND	U
Toluene	4.81429	
trans-2-Butene	0.06125	
trans-2-Hexene	ND	U
trans-2-Pentene	0.02680	

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Garfield County - URSA Pad Site Specific Conditional Sampler
 August 2018
 Grab Sample

Detected Compound	Concentration (ppbV)	Comments
1,2,3-Trimethylbenzene	ND	U
1,2,4-Trimethylbenzene	0.33111	
1,3,5-Trimethylbenzene	0.25556	
1,3-Butadiene	0.02575	U
1-Butene	ND	CE, U
1-Dodecene	0.02858	U
1-Heptene	ND	CE, U
1-Hexene	0.09533	
1-Nonene	0.11889	
1-Octene	0.24500	
1-Pentene	0.16360	
1-Tridecene	ND	U
1-Undecene	0.05836	
2,2,3-Trimethylpentane	ND	U
2,2,4-Trimethylpentane	ND	CE, U
2,2-Dimethylbutane	0.09317	
2,3,4-Trimethylpentane	ND	CE, U
2,3-Dimethylbutane	0.20000	
2,3-Dimethylpentane	0.15286	
2,4-Dimethylpentane	0.10500	
2-Ethyl-1-butene	ND	U
2-Methyl-1-butene	0.04780	
2-Methyl-1-pentene	ND	U
2-Methyl-2-butene	ND	CE, U
2-Methylheptane	0.53000	
2-Methylhexane	0.52143	
2-Methylpentane	0.73167	
3-Methyl-1-butene	ND	U
3-Methylheptane	0.42250	
3-Methylhexane	0.54857	
3-Methylpentane	0.39167	
4-Methyl-1-pentene	ND	U
Acetylene	0.23050	
a-Pinene	ND	U
Benzene	0.96000	
b-Pinene	ND	U
cis-2-Butene	0.03425	
cis-2-Hexene	ND	U
cis-2-Pentene	ND	U
Cyclohexane	1.18000	
Cyclopentane	0.08280	

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Garfield County - URSA Pad Site Specific Conditional Sampler
 August 2018
 Grab Sample

Detected Compound	Concentration (ppbV)	Comments
Cyclopentene	ND	U, CE
Ethane	14.00000	
Ethylbenzene	0.12263	
Ethylene	2.30500	
Isobutane	1.18250	
Isobutylene	ND	U, CE
Isopentane	ND	U, CE
Isoprene	0.63400	
Isopropylbenzene	ND	U
m-Diethylbenzene	ND	U
Methylcyclohexane	3.18571	
Methylcyclopentane	0.65667	
m-Ethyltoluene	0.23444	
m-Xylene/p-Xylene	1.18500	
n-Butane	1.49000	
n-Decane	0.66300	
n-Dodecane	0.08833	
n-Heptane	1.20571	
n-Hexane	1.11667	
n-Nonane	1.12222	
n-Octane	1.61250	
n-Pentane	1.00200	
n-Propylbenzene	ND	U
n-Tridecane	ND	U
n-Undecane	0.29182	
o-Ethyltoluene	ND	U
o-Xylene	0.20000	
p-Diethylbenzene	ND	U
p-Ethyltoluene	0.10100	
Propane	4.36667	
Propylene	1.04667	
Propyne	ND	U
Styrene	ND	CE, U
Toluene	7.74286	
trans-2-Butene	0.06075	
trans-2-Hexene	ND	U
trans-2-Pentene	0.03720	

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Garfield County - URSA Pad Site Specific Conditional Sampler
 September 2018
 Upwind Canister

Detected Compound	Concentration (ppbV)	Comments
1,2,3-Trimethylbenzene	0.05578	
1,2,4-Trimethylbenzene	0.04889	
1,3,5-Trimethylbenzene	0.02967	
1,3-Butadiene	ND	U
1-Butene	ND	CE, U
1-Dodecene	ND	U
1-Heptene	ND	CE, U
1-Hexene	ND	CE, U
1-Nonene	0.02589	
1-Octene	0.04538	
1-Pentene	0.03520	
1-Tridecene	ND	U
1-Undecene	ND	U
2,2,3-Trimethylpentane	ND	U
2,2,4-Trimethylpentane	ND	CE, U
2,2-Dimethylbutane	0.02317	
2,3,4-Trimethylpentane	ND	U
2,3-Dimethylbutane	0.04100	
2,3-Dimethylpentane	ND	CE, U
2,4-Dimethylpentane	0.02486	
2-Ethyl-1-butene	ND	U
2-Methyl-1-butene	0.01780	
2-Methyl-1-pentene	ND	CE, U
2-Methyl-2-butene	ND	U
2-Methylheptane	0.06788	
2-Methylhexane	0.08686	
2-Methylpentane	0.23667	
3-Methyl-1-butene	ND	U
3-Methylheptane	0.06400	
3-Methylhexane	0.11743	
3-Methylpentane	0.10467	
4-Methyl-1-pentene	ND	U
Acetylene	0.07850	
a-Pinene	ND	U
Benzene	0.23000	
b-Pinene	ND	U
cis-2-Butene	ND	U
cis-2-Hexene	ND	U
cis-2-Pentene	ND	U
Cyclohexane	0.25167	
Cyclopentane	0.02620	

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Garfield County - URSA Pad Site Specific Conditional Sampler
 September 2018
 Upwind Canister

Detected Compound	Concentration (ppbV)	Comments
Cyclopentene	ND	CE, U
Ethane	5.65000	
Ethylbenzene	0.01950	
Ethylene	1.31500	
Isobutane	0.44000	
Isobutylene	ND	CE, U
Isopentane	ND	CE, U
Isoprene	0.31400	
Isopropylbenzene	0.05611	
m-Diethylbenzene	ND	U
Methylcyclohexane	0.57286	
Methylcyclopentane	0.16600	
m-Ethyltoluene	ND	U
m-Xylene/p-Xylene	0.18375	
n-Butane	0.55250	
n-Decane	0.08670	
n-Dodecane	0.02550	U
n-Heptane	0.21571	
n-Hexane	0.30000	
n-Nonane	0.12444	
n-Octane	0.23375	
n-Pentane	0.62200	
n-Propylbenzene	0.03422	
n-Tridecane	ND	U
n-Undecane	0.06318	
o-Ethyltoluene	ND	U
o-Xylene	0.04750	
p-Diethylbenzene	ND	U
p-Ethyltoluene	ND	U
Propane	1.75333	
Propylene	0.22367	
Propyne	ND	U
Styrene	ND	CE, U
Toluene	4.52857	
trans-2-Butene	ND	U
trans-2-Hexene	ND	U
trans-2-Pentene	ND	U

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Garfield County - URSA Pad Site Specific Conditional Sampler
 September 2018
 Downwind Canister

Detected Compound	Concentration (ppbV)	Comments
1,2,3-Trimethylbenzene	0.08767	
1,2,4-Trimethylbenzene	0.28889	
1,3,5-Trimethylbenzene	0.29667	
1,3-Butadiene	ND	U
1-Butene	ND	CE, U
1-Dodecene	ND	U
1-Heptene	ND	CE, U
1-Hexene	ND	CE, U
1-Nonene	ND	U
1-Octene	0.19500	
1-Pentene	0.03520	
1-Tridecene	ND	U
1-Undecene	ND	U
2,2,3-Trimethylpentane	ND	U
2,2,4-Trimethylpentane	ND	CE, U
2,2-Dimethylbutane	0.13100	
2,3,4-Trimethylpentane	ND	U
2,3-Dimethylbutane	0.27167	
2,3-Dimethylpentane	0.22571	
2,4-Dimethylpentane	0.14571	
2-Ethyl-1-butene	ND	U
2-Methyl-1-butene	ND	U
2-Methyl-1-pentene	ND	U
2-Methyl-2-butene	0.02800	U
2-Methylheptane	0.71500	
2-Methylhexane	ND	CE, U
2-Methylpentane	1.06833	
3-Methyl-1-butene	ND	U
3-Methylheptane	0.58250	
3-Methylhexane	0.75857	
3-Methylpentane	0.64833	
4-Methyl-1-pentene	ND	U
Acetylene	0.08000	
a-Pinene	ND	U
Benzene	0.93000	
b-Pinene	ND	U
cis-2-Butene	ND	U
cis-2-Hexene	ND	U
cis-2-Pentene	ND	U
Cyclohexane	1.78333	
Cyclopentane	0.13340	

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Garfield County - URSA Pad Site Specific Conditional Sampler
 September 2018
 Downwind Canister

Detected Compound	Concentration (ppbV)	Comments
Cyclopentene	ND	CE, U
Ethane	32.10000	
Ethylbenzene	0.13125	
Ethylene	1.25500	
Isobutane	2.55000	
Isobutylene	ND	CE, U
Isopentane	ND	CE, U
Isoprene	0.37600	
Isopropylbenzene	ND	U
m-Diethylbenzene	ND	U
Methylcyclohexane	4.77143	
Methylcyclopentane	1.07333	
m-Ethyltoluene	0.21111	
m-Xylene/p-Xylene	1.62500	
n-Butane	2.80000	
n-Decane	0.74500	
n-Dodecane	0.09000	
n-Heptane	1.81429	
n-Hexane	1.63833	
n-Nonane	1.28889	
n-Octane	2.20000	
n-Pentane	1.44800	
n-Propylbenzene	ND	U
n-Tridecane	ND	U
n-Undecane	0.29091	
o-Ethyltoluene	ND	U
o-Xylene	0.25750	
p-Diethylbenzene	ND	U
p-Ethyltoluene	0.13556	
Propane	9.53333	
Propylene	0.28033	
Propyne	ND	U
Styrene	ND	CE, U
Toluene	3.95714	
trans-2-Butene	ND	U
trans-2-Hexene	ND	U
trans-2-Pentene	0.01460	

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