



**GARFIELD COUNTY  
QUARTERLY MONITORING REPORT**

**SECOND QUARTER  
APRIL 1 THROUGH JUNE 30, 2010**

Prepared for:

**Garfield County Public Health Department**  
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Prepared by:

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September 30, 2010

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## 1.0 INTRODUCTION

This air quality data summary report has been prepared by Air Resource Specialists, Inc. (ARS) for the Garfield County Public Health Department (GCPHD). This report summarizes data collected from April 1, 2010 through June 30, 2010 at the Garfield County monitoring sites, including metrological characteristics, criteria pollutant levels, and levels of volatile organic compounds (VOCs). Any questions regarding the contents of this report should be addressed to:

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## 1.1 BACKGROUND

Oil and gas exploration and production within the Piceance Basin in Colorado, and elsewhere in the Rocky Mountain region, has undergone rapid growth over the last decade. In response to this growth, concerns have grown regarding air quality impacts of oil and gas development in Garfield County. The Garfield County Public Health Department (GCPHD) is committed to protecting the health and welfare of its citizens. In 2005, the GCPHD enhanced air quality monitoring efforts to evaluate levels of particulate matter  $\leq 10$  microns ( $PM_{10}$ ) and VOCs in the area. In 2008, the monitoring network was modified to encompass speciated non-methane organic compounds (SNMOCs) and carbonyl compounds. Also, the regulatory monitoring network expanded from  $PM_{10}$  to include particulate matter  $\leq 2.5$  microns ( $PM_{2.5}$ ) and ozone ( $O_3$ ). These changes were designed to serve a wide range of purposes, including monitoring of criteria pollutant levels, ozone formation potential, toxics assessments, and source attribution.

The current monitoring network in Garfield County consists of four (4) monitoring stations. Characteristics of the monitoring locations are described below.

- Parachute (PACO): Parachute is a small urban center of approximately 1,300 people within very close proximity to oil and development and production activities. The town is located along Interstate 70 and is the transportation hub for heavily traveled roads which service the surrounding canyons.
- Rifle (RICO): Rifle is a rapidly growing urban center on the Interstate 70 corridor with estimated population of about 9,200 people. Rifle is in close proximity to oil and gas development activities, and is also central to industrial support for the oil and gas industry.
- Bell-Melton (BRCO): The Bell-Melton site is a rural homestead approximately four miles south of the town of Silt, in close proximity to moderate oil and gas development and heavy natural gas production.

- Rulison (RUCO): Rulison is a rural community located about nine miles southeast of Parachute and five miles west of Rifle along Interstate 70. This site began operation in January 2009 amid substantial natural gas development and production activities.

Figure 1-1 is a map of the monitoring sites in Garfield County and Table 1-1 lists the parameters monitored. The Garfield County Public Health Department (GCPHD) monitors pollutants and meteorology at these stations with technical support from several agencies. Filter based PM<sub>10</sub> monitors in Rifle and Parachute are operated by the GCPHD, with filter analysis supported by the Colorado Department of Public Health and Environment (CDPHE). SNMOC and carbonyl compounds are sampled at all sites and analyzed by the Eastern Research Group, Inc. (ERG). The GCPHD monitors meteorology at the Rulison and Bell-Melton sites, and at the Parachute site through March 22, 2010. Air Resource Specialists, Inc. (ARS) supports monitoring, data collection and data validation for continuous PM<sub>10</sub> and PM<sub>2.5</sub>, O<sub>3</sub>, and meteorology at the Rifle site, and meteorology at the Parachute site. GCPHD also operates a digital Web camera at the Rifle site. Camera images are collected every 15-minutes and displayed on the Garfield County Air Quality Monitoring Web site (<http://www.garfieldcountyaq.net>), along with associated data.

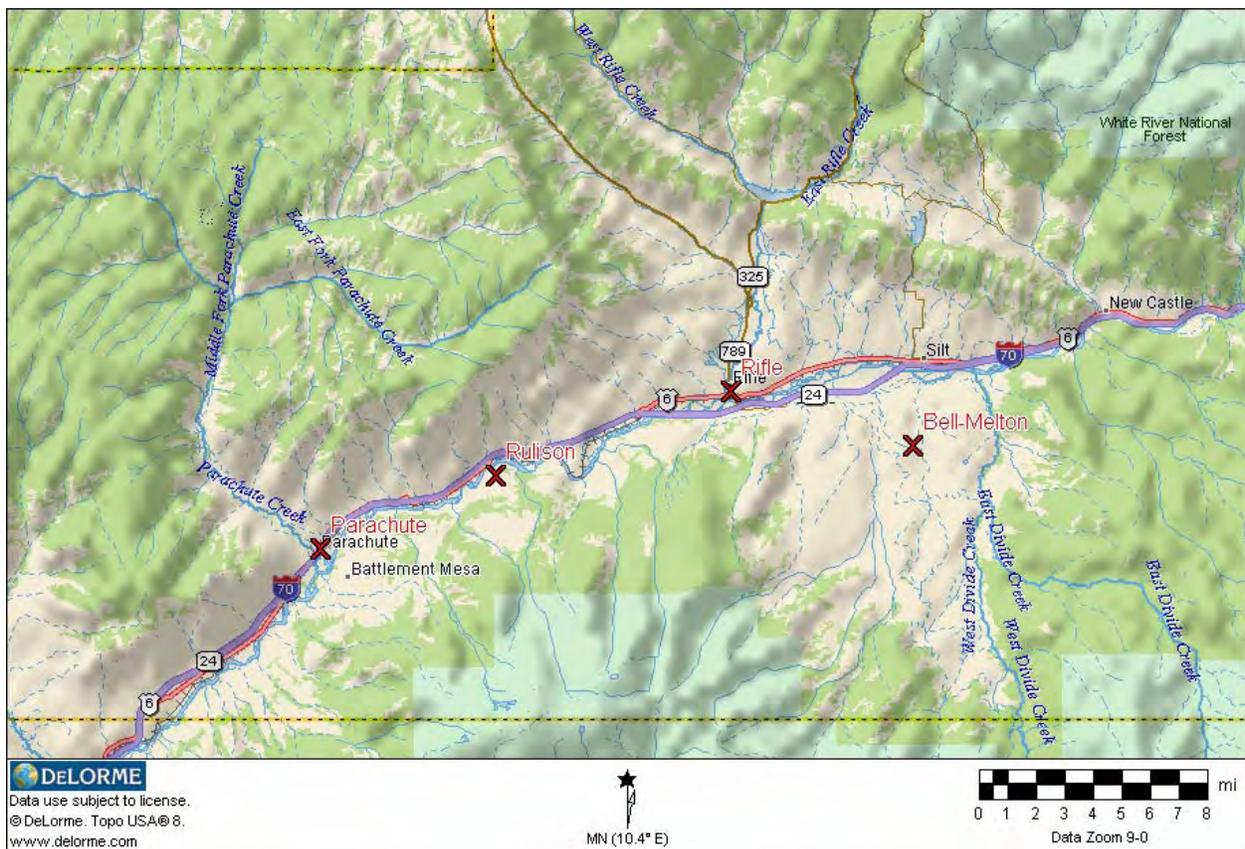


Figure 1-1. Map of Garfield County Monitoring Sites.

Table 1-1

Garfield County  
Parameters Monitored by Site

Component	Method	Sampling Frequency	Reporting Agency
<b>Rifle, Colorado</b>			
SNMOC	TO-12	24-hour (1/6 day)	ERG
Carbonyls	TO-11A	24-hour (1/12 day)	ERG
PM <sub>10</sub>	FRM	24-hour (1/3 day)	CDPHE
PM <sub>10</sub>	TEOM	Hourly	ARS
PM <sub>2.5</sub>	TEOM	Hourly	ARS
Ozone	42C	Hourly	ARS
Meteorology	Various	Hourly	ARS
Visibility Web Camera	Digital	15-min	ARS
<b>Parachute, Colorado</b>			
SNMOC	TO-12	24-hour (1/6 day)	ERG
Carbonyls	TO-11A	24-hour (1/12 day)	ERG
PM <sub>10</sub>	FRM	24-hour (1/3 day)	CDPHE
Meteorology	Various	Hourly	ARS
<b>Bell-Melton, Colorado</b>			
SNMOC	TO-12	24-hour (1/6 day)	ERG
Carbonyls	TO-11A	24-hour (1/12 day)	ERG
Meteorology	Various	Hourly	GCPHD
<b>Rulison, Colorado</b>			
SNMOC	TO-12	24-hour (1/6 day)	ERG
Carbonyls	TO-11A	24-hour (1/12 day)	ERG
Meteorology	Various	Hourly	GCPHD

## **2.0 METEOROLOGICAL SUMMARIES**

Meteorological data collected along with air quality parameters are used to better understand the local conditions and transport of air pollutants. Meteorological data collected at these sites includes wind speed, wind direction, temperature, relative humidity, and precipitation. Time series plots for all parameters collected between April 1, 2010 and June 30, 2010 are presented in Appendix A.

Figures 2-1 through 2-5 present quarterly wind roses for all monitoring sites. A wind rose shows the frequency of wind direction and uses different shading to represent wind speeds. Generally, winds at the Parachute site come from the northeast and southwest. Winds at the Bell-Melton site were predominantly out of the southeast and winds at the Rulison site were predominantly out of the south-southwest and the northeast.

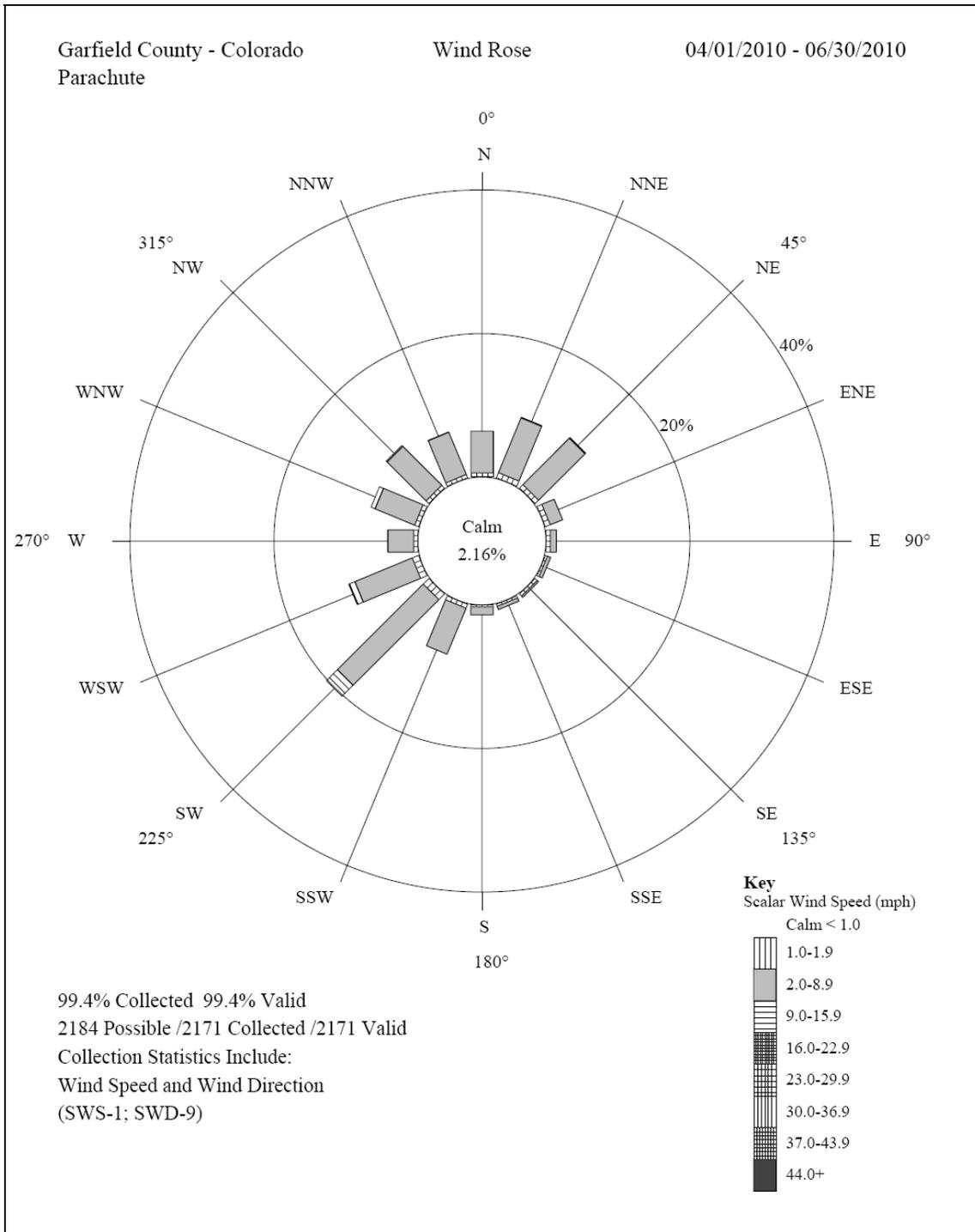


Figure 2-1. Quarterly Wind Rose for the Parachute Monitoring Site.

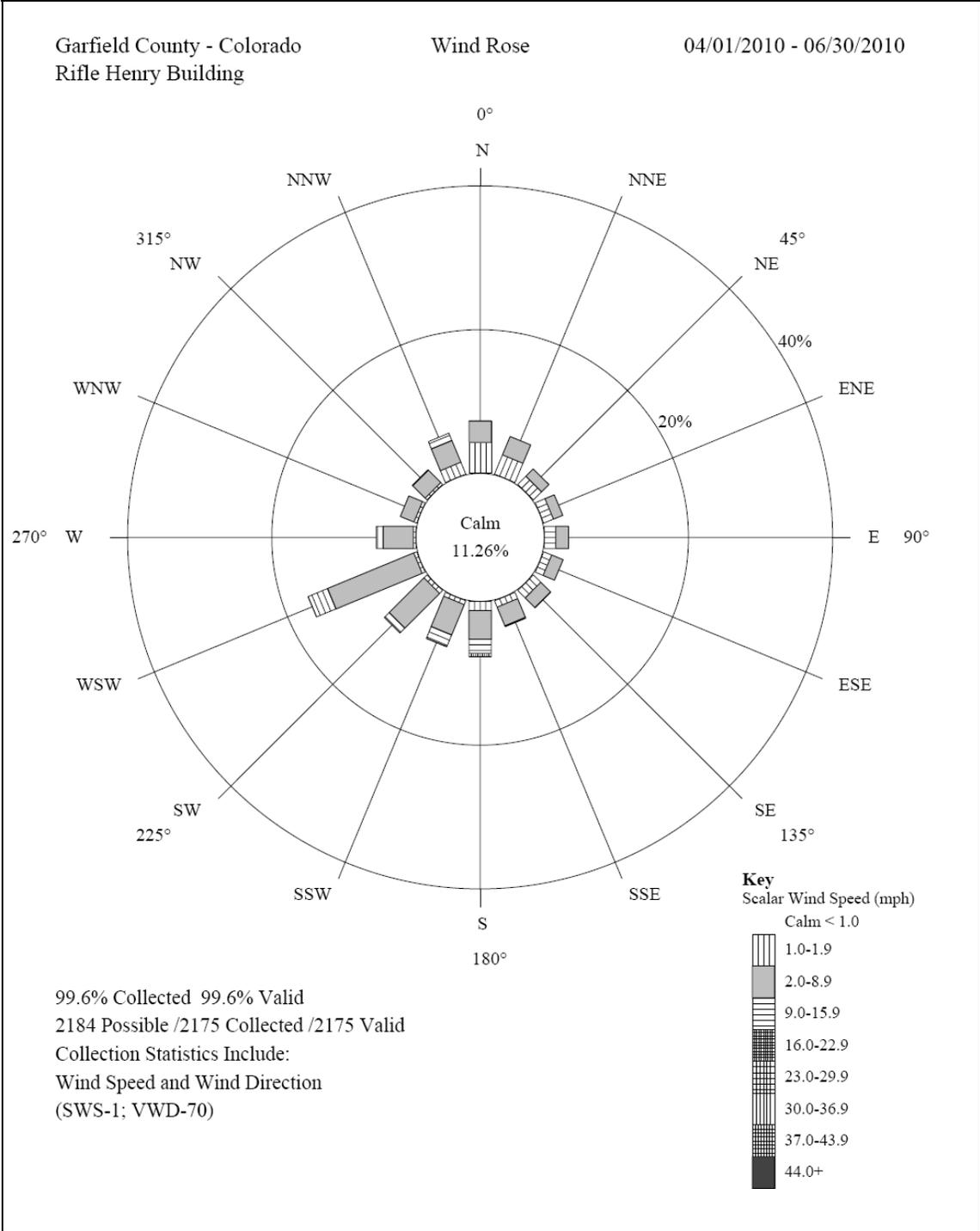


Figure 2-2. Quarterly Wind Rose for the Rifle Monitoring Site.

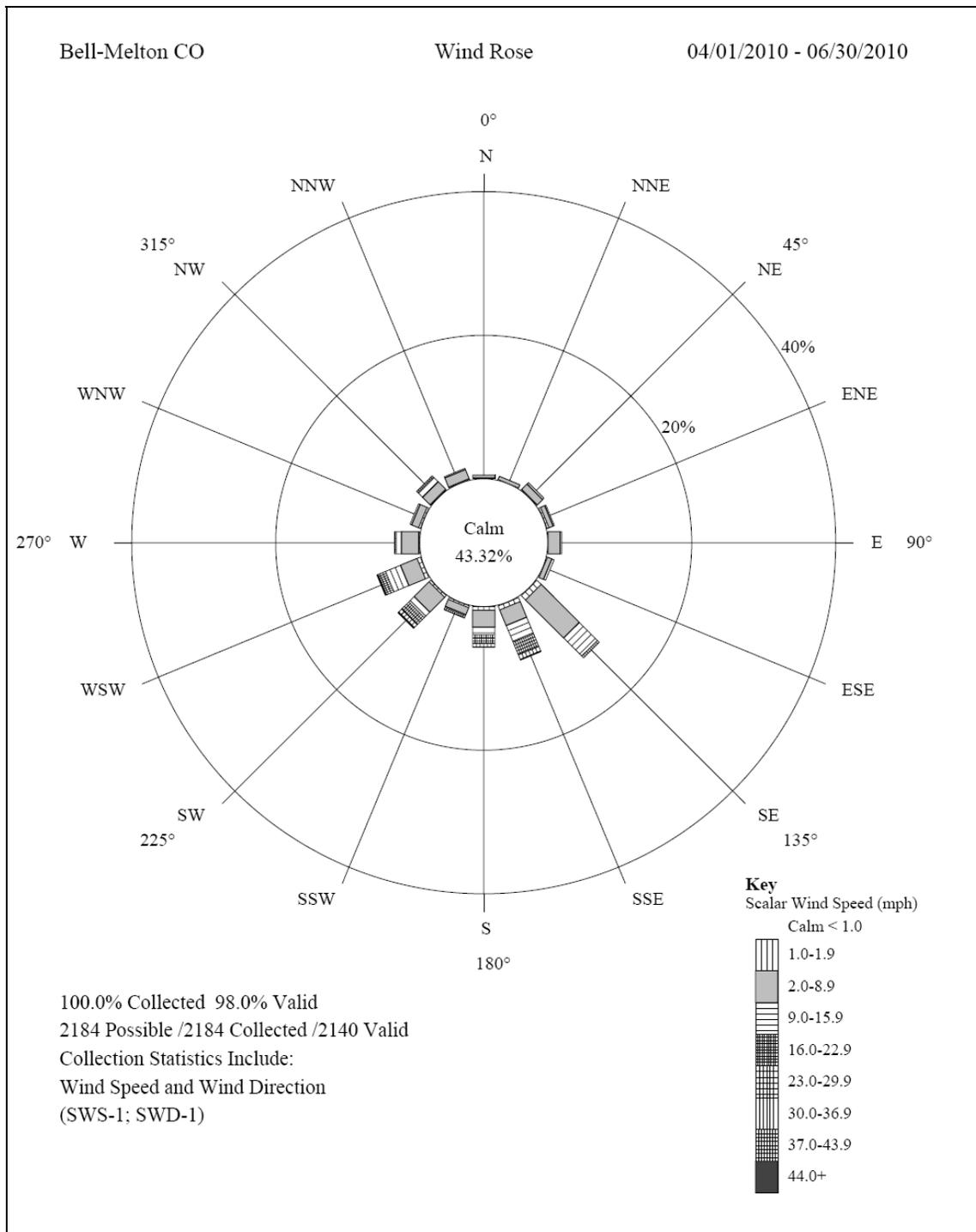


Figure 2-3. Quarterly Wind Rose for the Bell-Melton Monitoring Site.

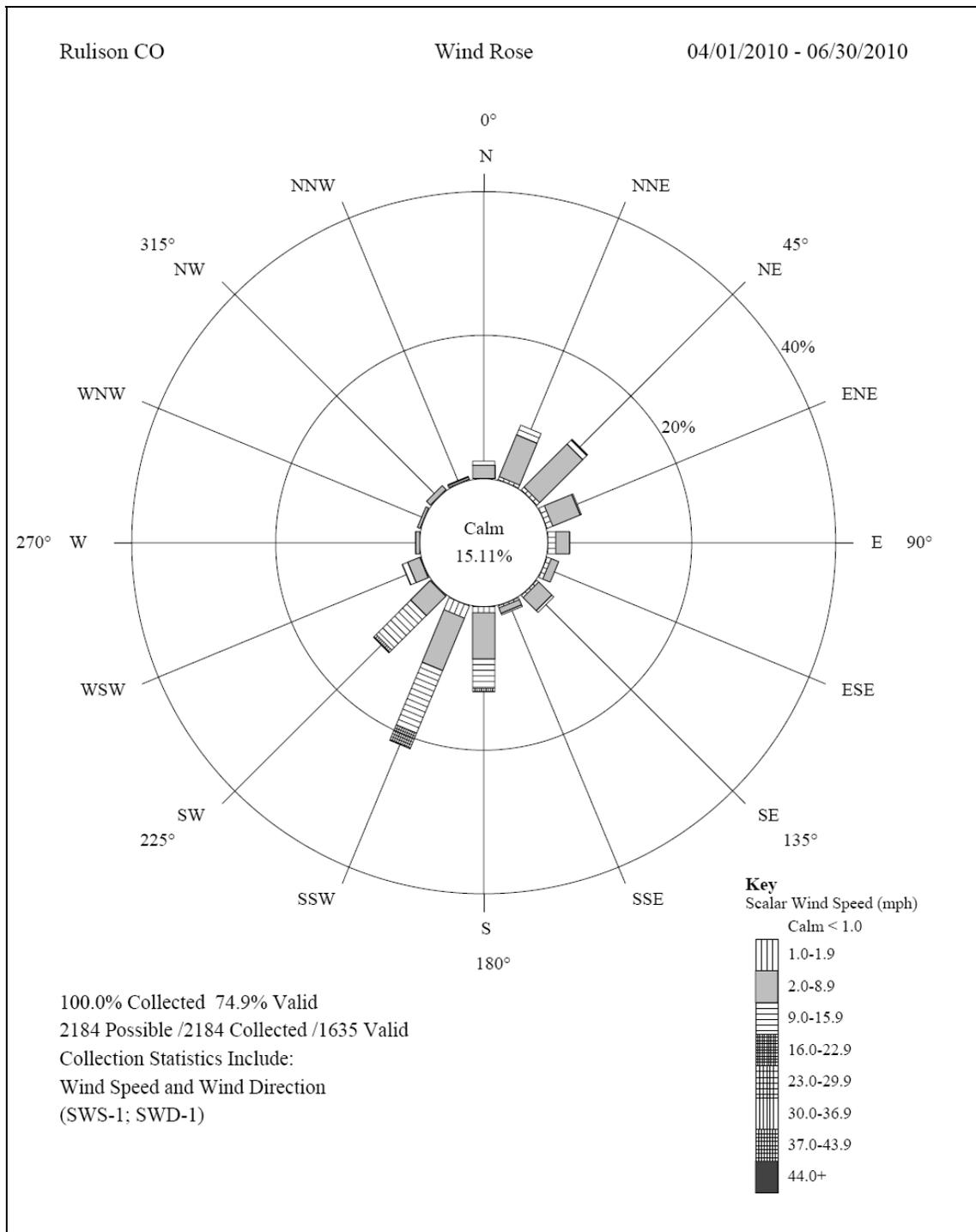


Figure 2-4. Quarterly Wind Rose for the Rulison Monitoring Site.

### 3.0 CRITERIA POLLUTANT SUMMARIES

The Clean Air Act requires the Environmental Protection Agency (EPA) to set two (2) types of National Ambient Air Quality Standards (NAAQS) for ground-level O<sub>3</sub>, particle pollution (PM<sub>2.5</sub> and PM<sub>10</sub>), lead, nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), and sulfur dioxide (SO<sub>2</sub>). The types of standards are as follows:

- Primary Standards: These standards are designed to protect public health with an adequate margin of safety, including the health of sensitive populations such as asthmatics, children, and the elderly.
- Secondary Standards: These standards are designed to protect public welfare from adverse effects, including visibility impairment and effects on the environment (e.g., vegetation, soils, water, and wildlife).

PM<sub>10</sub> is monitored using filter-based Federal Reference Method (FRM) samplers at the Parachute and Rifle sites. Continuous PM<sub>2.5</sub> and PM<sub>10</sub> are also monitored at the Rifle site. The level of the national primary and secondary ambient air quality standards for PM<sub>10</sub> is a 24-hour average concentration of 150 micrograms per cubic meter (µg/m<sup>3</sup>). A violation of the standard occurs when the number of days with a 24-hour average concentration above 150 µg/m<sup>3</sup> over a three (3) year period is equal to or less than one. The standards for PM<sub>2.5</sub> are an annual arithmetic mean of 15 µg/m<sup>3</sup>, and a 24-hour average of 35 µg/m<sup>3</sup>. A violation of the PM<sub>2.5</sub> standard occurs when the three (3) year average of the weighted annual mean exceeds that annual standard, or the three (3) year average of the 98th percentile 24-hour average value exceeds the 24-hour standard.

Continuous O<sub>3</sub> is monitored at the Rifle site. The NAAQS for O<sub>3</sub> is currently 0.075 ppm (75 ppb) over an 8-hour period. An exceedance of the standard occurs when an 8-hour average O<sub>3</sub> concentration is greater than or equal to 76 ppb. A violation of the standard occurs when the three (3) year average of the fourth highest daily maximum 8-hour average ozone concentration equals or exceeds 76 ppb.

Values measured for O<sub>3</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub> measured year-to-date in 2010 at the Rifle site are presented with corresponding NAAQS in Table 3-1. PM<sub>10</sub> measured at the Parachute site is presented in Table 3-2. At present, air quality measurements in Garfield County do not violate air quality standards for these criteria pollutants.

Table 3-1

Rifle Site  
Standards Summary  
January 1, 2010 – June 30, 2010

Parameter	NAAQS		Measured	
	Averaging Time	Standard	Measured Value	Date(s)
Ozone (O <sub>3</sub> )	Rolling 8-hour	0.075 ppm/ 75 ppb	Highest Daily Max.: 69 ppb	5/29
			4 <sup>th</sup> Highest Daily Max.: 66 ppb	4/14, 4/15, 6/23
Particulate Matter ≤2.5µm* (PM <sub>2.5</sub> )	Annual	15 µg/m <sup>3</sup>	Arithmetic Mean: 8.5 µg/m <sup>3</sup>	1/1-6/30
	24-hour	35 µg/m <sup>3</sup>	Highest Daily Max.: 29.0 µg/m <sup>3</sup> 2 <sup>nd</sup> Highest Daily Max.: 24.5 µg/m <sup>3</sup>	1/3 1/2
Particulate Matter ≤10µm** (PM <sub>10</sub> )	24-hour	150 µg/m <sup>3</sup>	Highest Daily Max.: 59 µg/m <sup>3</sup>	5/29
			2 <sup>nd</sup> Highest Daily Max.: 55 µg/m <sup>3</sup>	6/16

\*Calculated using continuous TEOM measurements

\*\*Calculated using 1/3 day filter-based measurements

Table 3-2

Parachute Site  
Standards Summary  
January 1, 2010 – June 30, 2010

Parameter	NAAQS		Measured	
	Averaging Time	Standard	Measured Value	Date(s)
Particulate Matter ≤10µm (PM <sub>10</sub> )	24-hour	150 µg/m <sup>3</sup>	Highest Daily Max.: 125 µg/m <sup>3</sup>	5/23
			2 <sup>nd</sup> Highest Daily Max.: 52 µg/m <sup>3</sup>	5/11

### 3.1 OZONE

Ozone is measured at the Rifle site. Figure 3-1 presents daily maximum 8-hour averages of ozone measured year-to-date in 2010 along with the NAAQS. Table 3-3 presents the highest daily maximum 8-hour O<sub>3</sub> measurements in 2010.

Figure 3-2 presents a quarterly O<sub>3</sub> pollutant rose for the Rifle site. The highest ozone values were associated with winds between the south and west. Figure 3-3 presents the quarterly diurnal cycle of measured hourly O<sub>3</sub> at the Rifle station. The cycle shows lowest concentrations in the early morning hours and maximum concentrations in the late afternoon. This pattern results from daytime photochemical production from oxides of nitrogen (NO<sub>x</sub>) (NO + NO<sub>2</sub>) and VOC precursors, and ozone loss by dry deposition and reaction with NO at night.

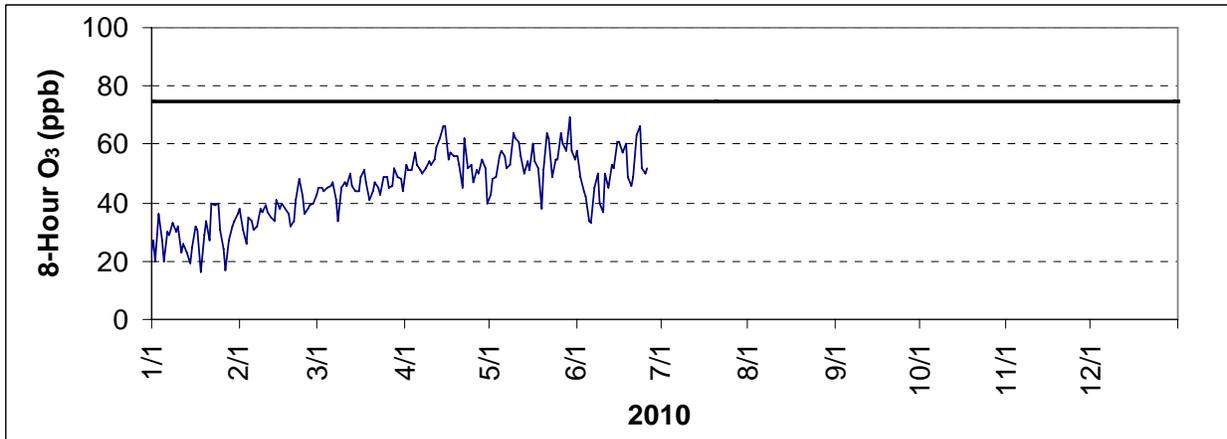


Figure 3-1. Daily Maximum 8-Hour Averages of Ozone Monitored at the Rifle Site.

Table 3-3

Rifle Site  
 Ten Highest Daily Maximum 8-Hour Ozone Averages  
 January 1, 2010 – March 31, 2010

Level	Date	Daily Maximum 8-Hour Ozone (ppb)
1	5/29/2010	69
2	4/14/2010	66
3	4/15/2010	66
<b>4*</b>	6/23/2010	<b>66</b>
5	5/9/2010	64
6	5/21/2010	64
7	5/26/2010	64
8	6/22/2010	63
9	4/13/2010	62
10	4/22/2010	62

\* The 3-year average of the 4th highest daily maximum is used to determine attainment status.

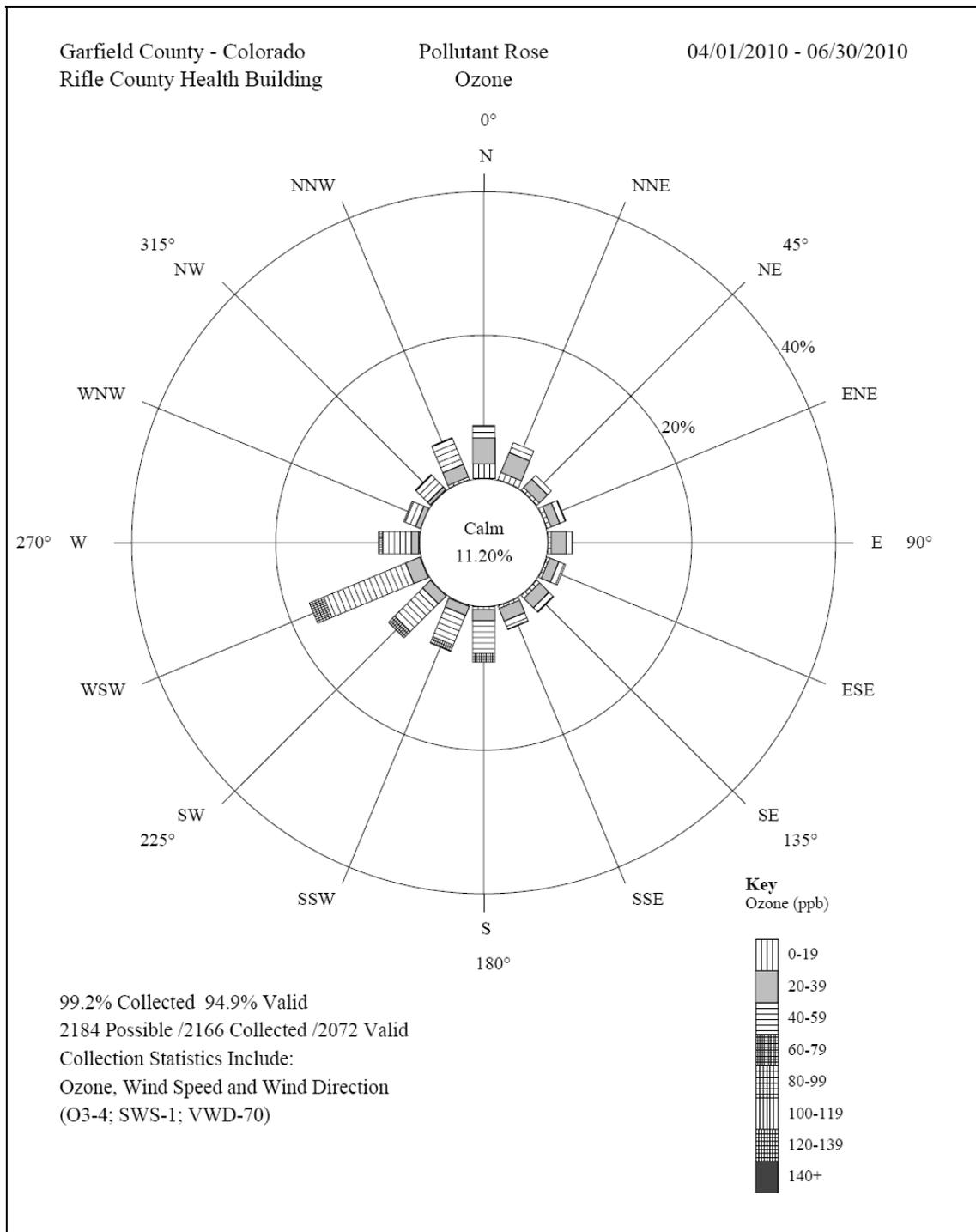
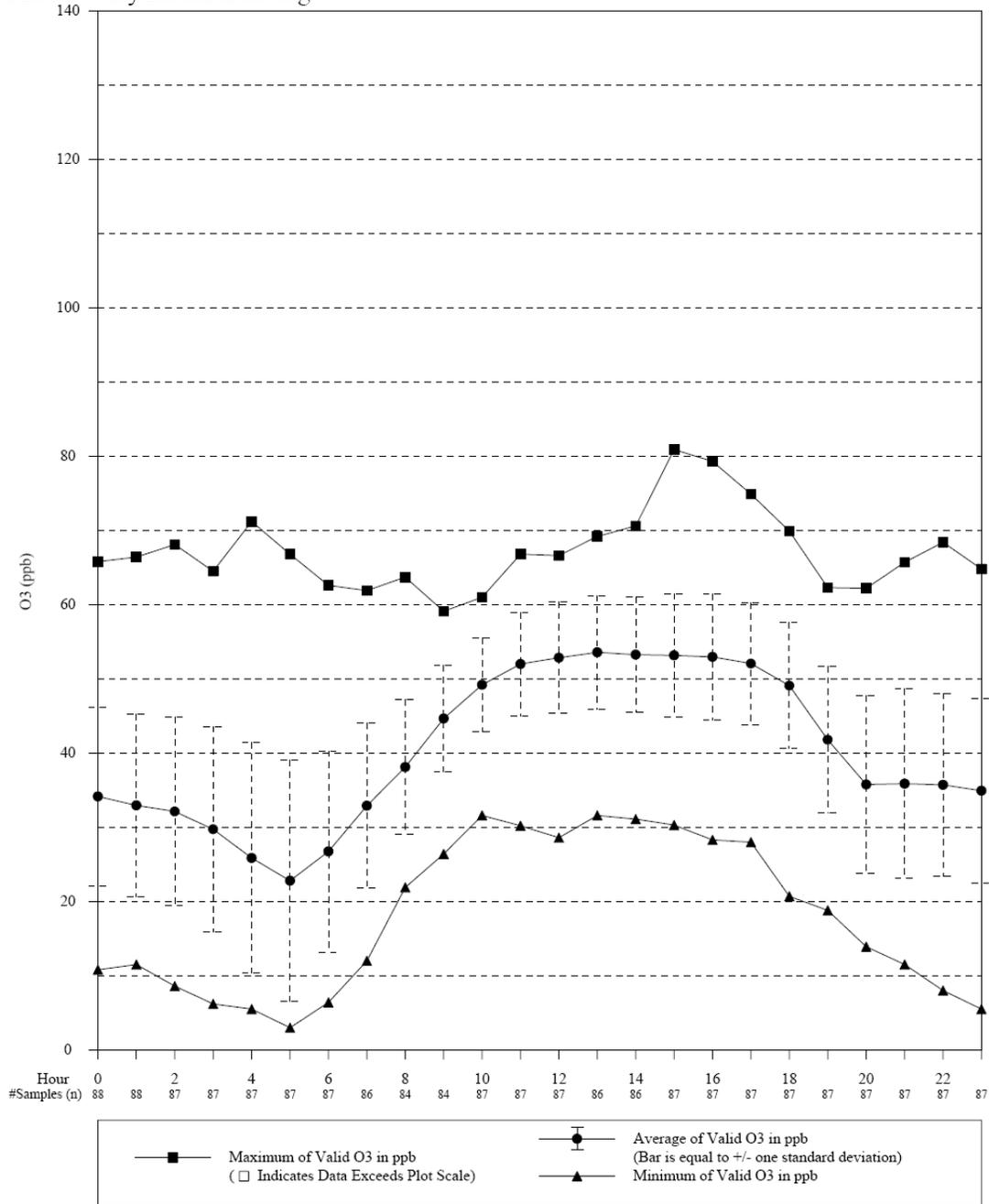


Figure 3-2. Quarterly Ozone Pollutant Rose for the Rifle Monitoring Site.

Garfield County  
 - Colorado  
 Rifle County Health Building

Diurnal Plot  
 Ozone

04/01/2010 - 06/30/2010



Final Validation

09-20-2010

Figure 3-3. Quarterly Ozone Diurnal Plot for Rifle Monitoring Site.

### **3.2 PARTICULATE MATTER (PM<sub>10</sub> AND PM<sub>2.5</sub>)**

Filter based 24-hour PM<sub>10</sub> samples are collected every third day at the Parachute and Rifle sites, and continuous hourly PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are collected at the Rifle site.

Figures 3-4 and 3-5 present quarterly PM<sub>10</sub> and PM<sub>2.5</sub> pollutant roses constructed from the continuous hourly data measured at the Rifle site. Highest particulate concentrations were measured when winds were out of the south-southwest. Figures 3-6 and 3-7 present quarterly diurnal plots for continuous PM<sub>10</sub> and PM<sub>2.5</sub>.

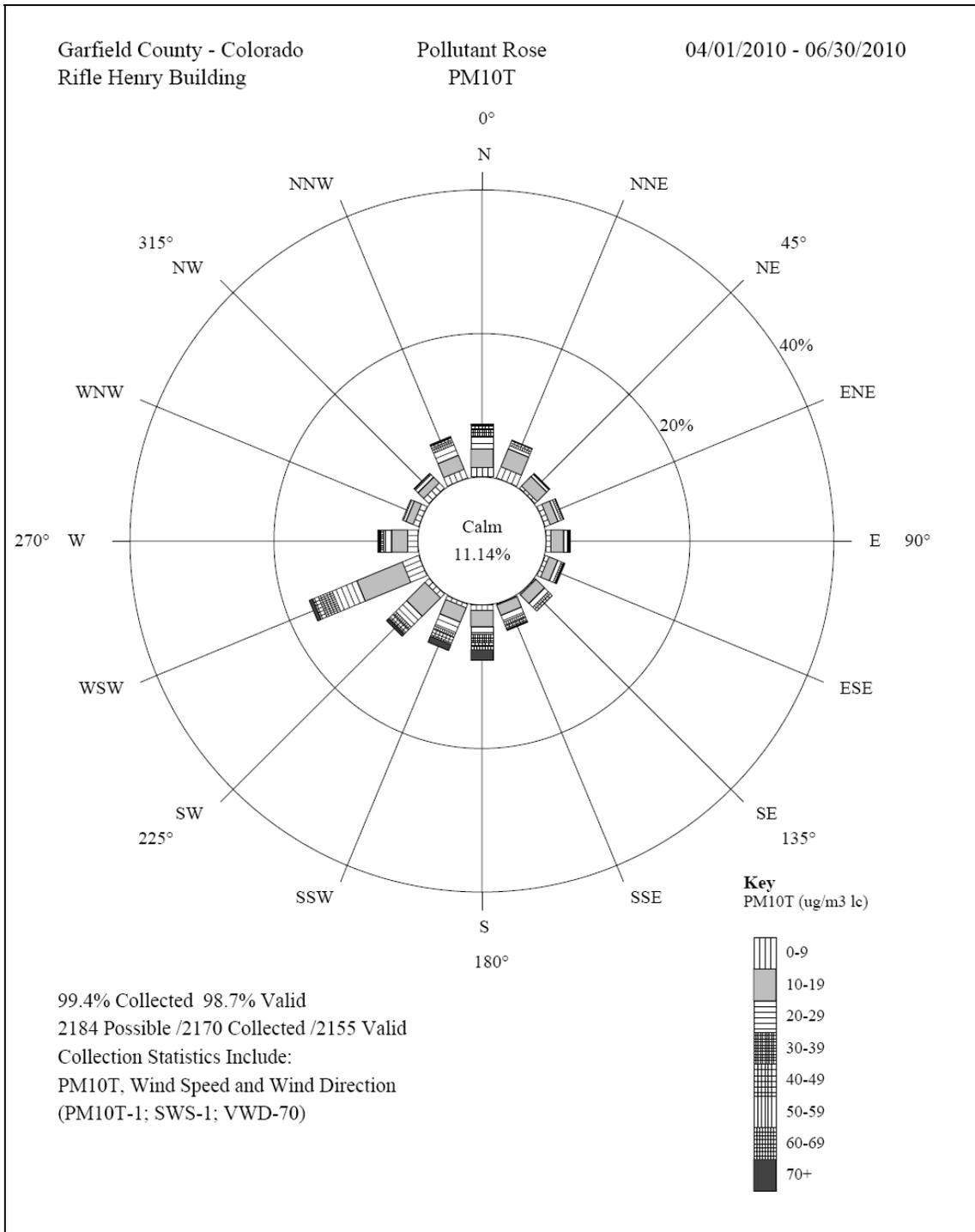


Figure 3-4. Quarterly PM<sub>10</sub> Pollutant Rose for the Rifle Monitoring Site.

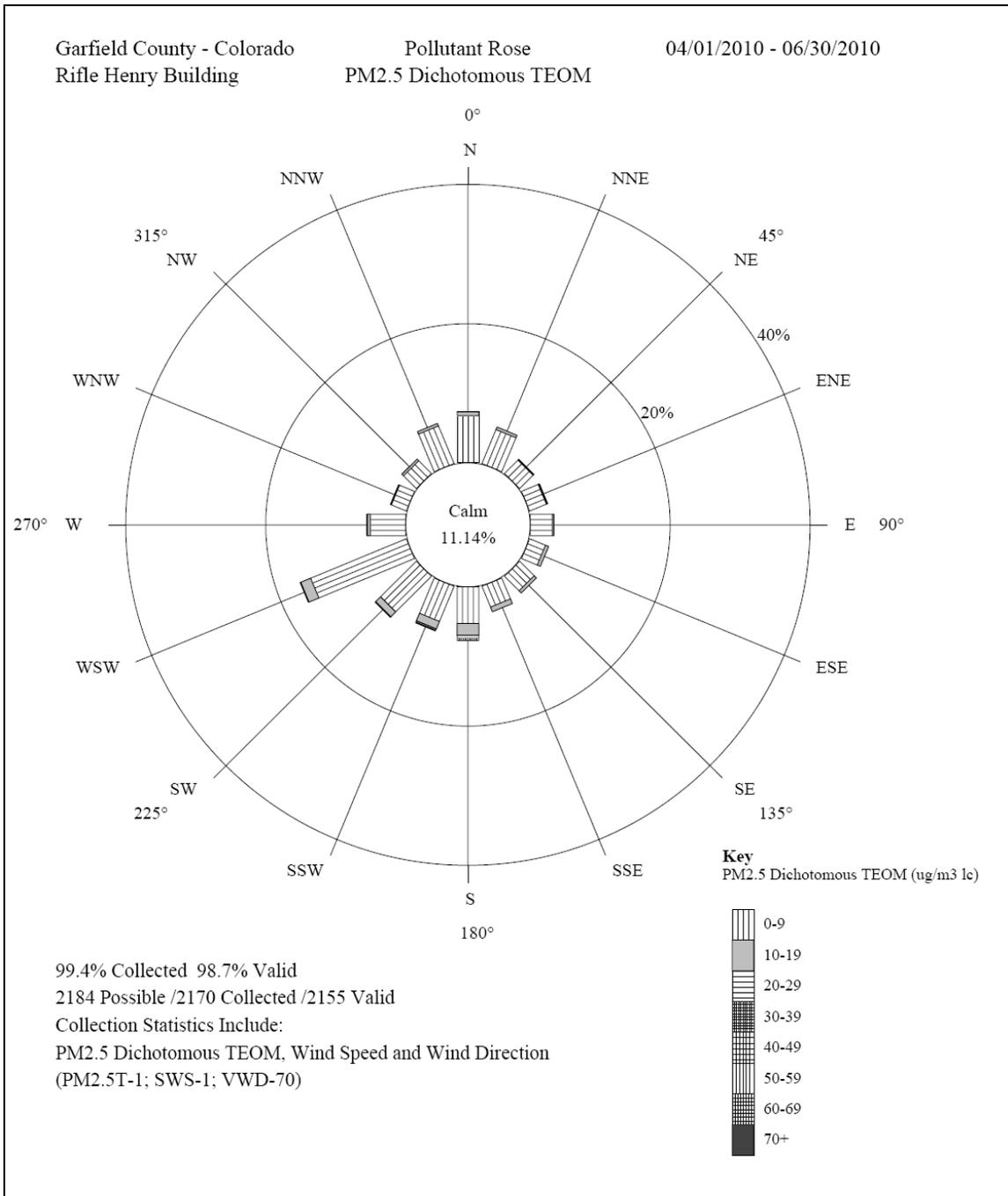


Figure 3-5. Quarterly PM<sub>2.5</sub> Pollutant Rose for the Rifle Monitoring Site.

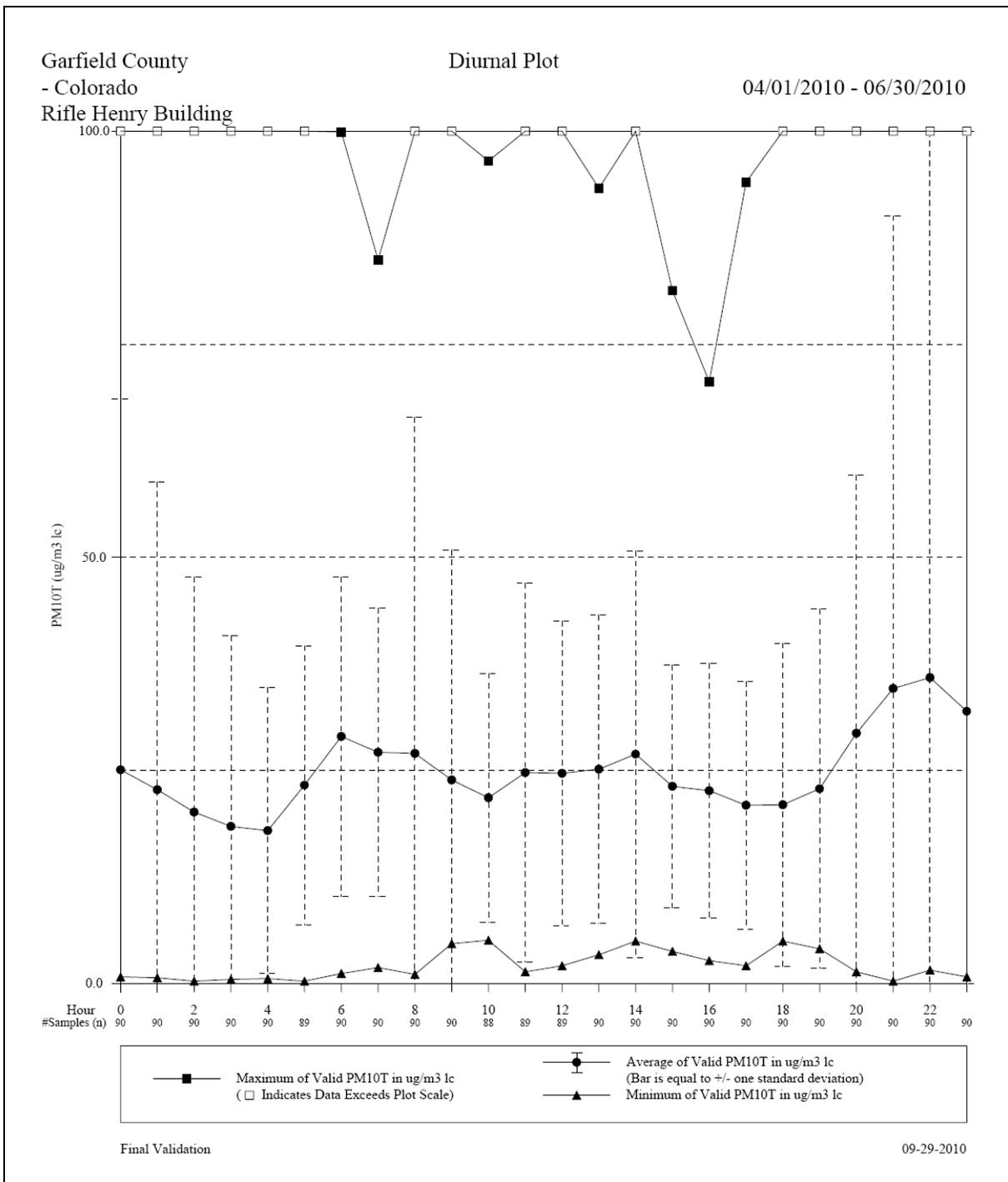
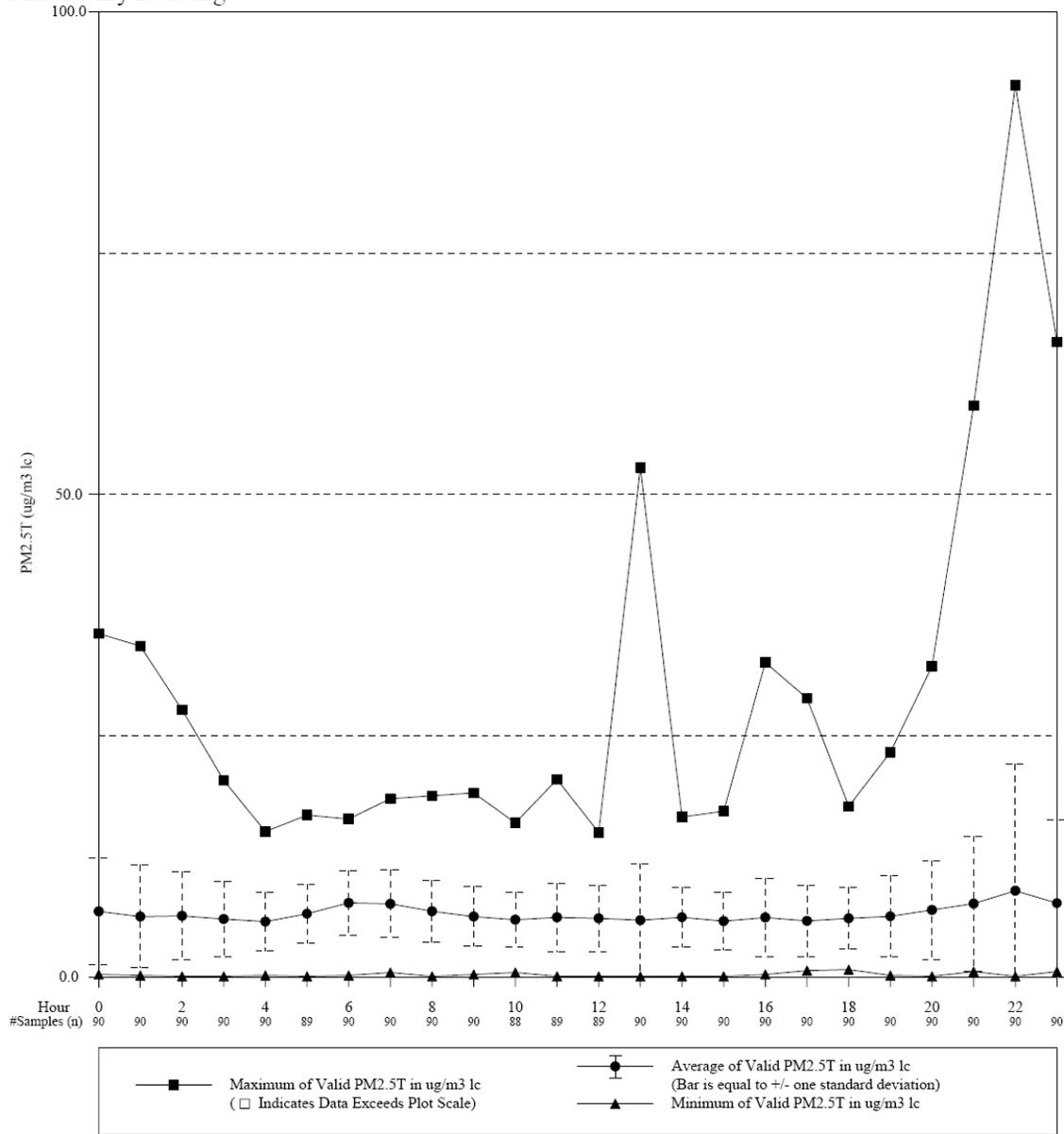


Figure 3-6. Quarterly PM<sub>10</sub> Diurnal Plot for the Rifle Monitoring Site.

Garfield County  
 - Colorado  
 Rifle Henry Building

Diurnal Plot  
 PM<sub>2.5</sub> Dichotomous TEOM

04/01/2010 - 06/30/2010



Final Validation

09-29-2010

Figure 3-7. Quarterly PM<sub>2.5</sub> Diurnal Plot for Rifle Monitoring Site.

## 4.0 SNMOC AND CARBONYL SUMMARIES

During the first quarter of 2010, SNMOCs and carbonyl compounds were monitored at four sites in Garfield. SNMOCs and carbonyl compounds are subsets of VOCs. VOCs are generally carbon- and hydrogen-based chemicals that exist in the gas phase or can evaporate from liquids. VOCs can react in the atmosphere to form ozone and fine 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 at low doses. Levels of HAPs will be analyzed in a separate annual risk assessment report prepared by the CDPHE. Summaries of SNMOC and carbonyl monitoring are presented in this section.

### 4.1 SNMOC

SNMOC compounds were collected and analyzed according to EPA Compendium Method TO-12, with 24-hour samples collected at all four sites on a 1-in-6 day schedule. This method includes analyses for 81 different compounds. Appendix B lists minimum, maximum, and average concentrations of all detected SNMOC compounds by site.

SNMOC compounds can be grouped into classifications with similar characteristics. For these summaries, measured SNMOC compounds were grouped into the following categories:

- **Light Alkanes:** Alkanes are the simplest hydrocarbons, consisting of only carbon and hydrogen with single bonds. Light alkanes, which here include alkanes with up to five carbon atoms (ethane, propane, iso/n-butane and iso/n-pentane) are the primary components of natural gas.
- **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.

Figure 4-1 presents categories of measured SNMOCs in units of ppbV (parts per billion by volume) measured to date in 2010 at each site. In general, compounds measured were dominated by light alkanes.

Figure 4-2 presents the year to date daily measurements by category in units of ppbC, where ppbC is results in ppbV multiplied by the number of carbons in each compound. Carbon content in a molecule is related to the compound reactivity, which contributes to ozone formation potential (discussed in Section 4.1.1). Heavier alkanes and aromatics are more significant sources of carbon, especially at the more urban Parachute and Rifle sites. The unknown category indicates the part of the total carbon measurements where individual species were not identified.

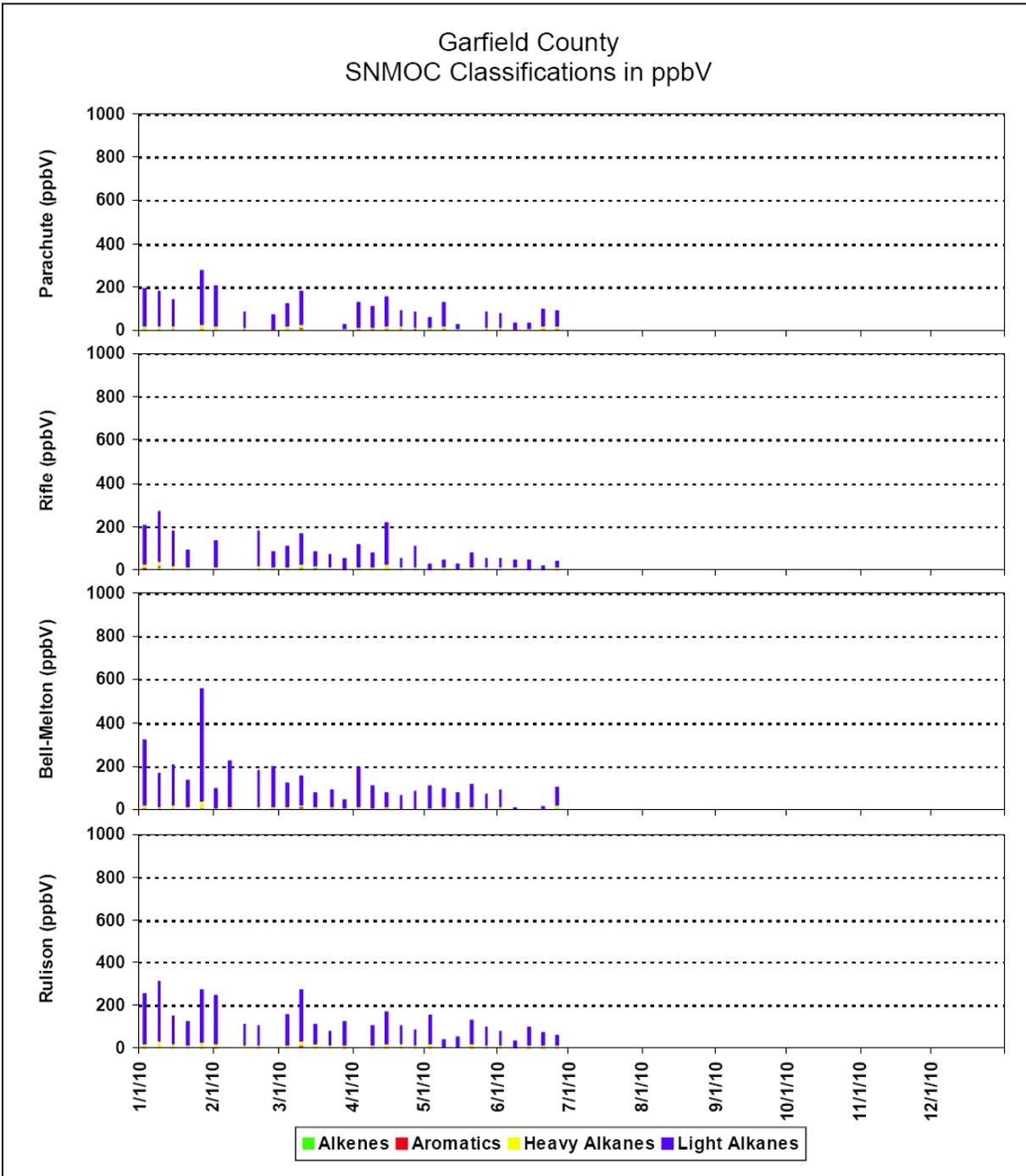


Figure 4-1. 24-Hour SNMOC Measurements by Category in Units of ppbV.

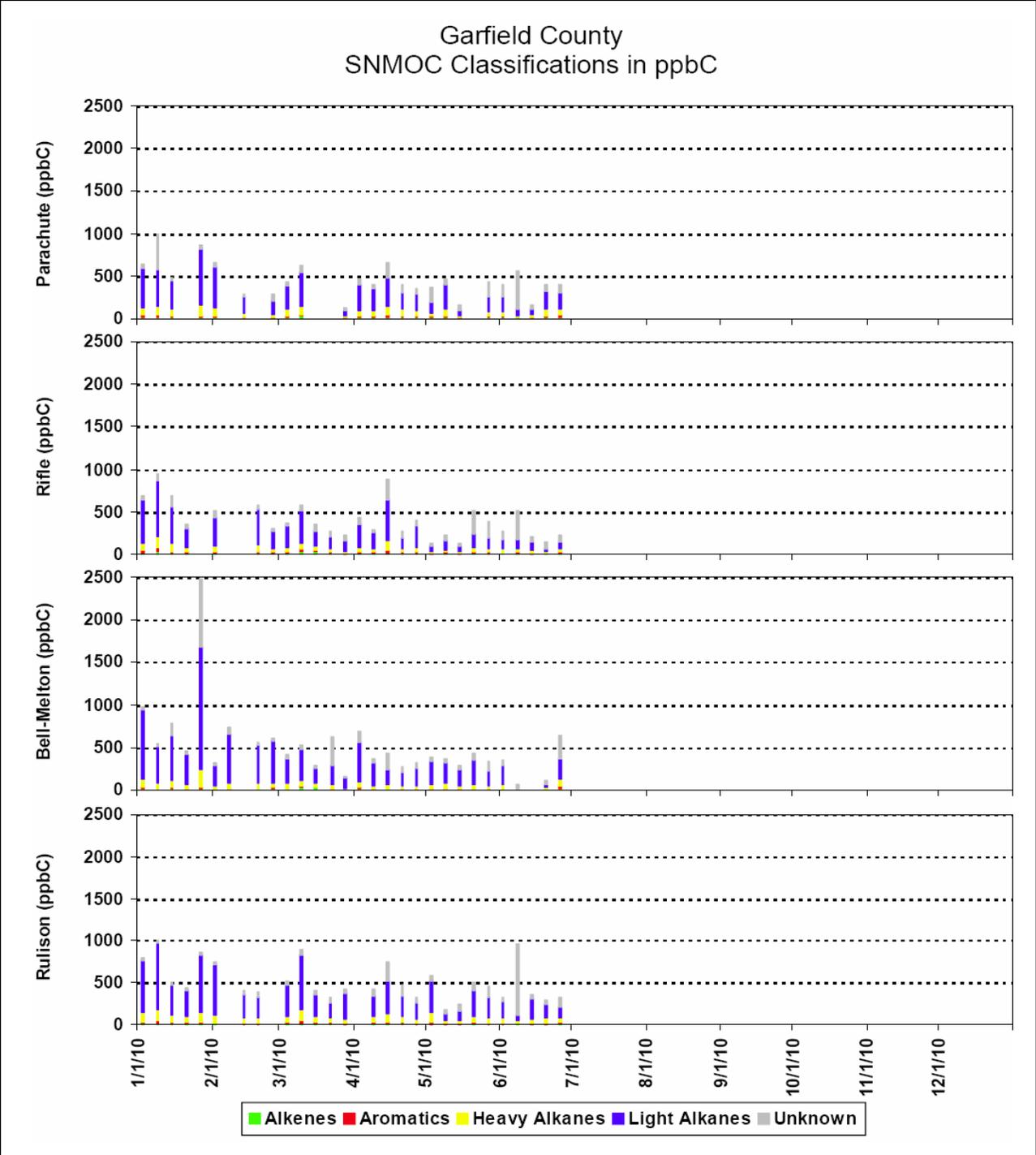


Figure 4-2. 24-Hour SNMOC Measurements by Category in Units of ppbC.

## 4.2 CARBONYLS

Carbonyl compounds were collected and analyzed according to EPA Compendium Method TO-11A, with 24-hour samples collected at all four sites on a 1-in-12 day schedule. This method includes analysis for twelve (12) different carbonyl compounds.

Carbonyls are highly reactive and play a critical role in the formation of ozone. Some carbonyls, including formaldehyde and acetaldehyde, also have adverse chronic and acute health effects. The major sources of directly emitted carbonyls are fuel combustion, mobile sources, and process emissions from oil refineries (CARB, 2009).

Appendix C lists minimum, maximum, and average concentrations of all detected carbonyl compounds. Major compounds included formaldehyde, acetaldehyde, and acetone. Figure 4-3 presents a time series of the major compounds measured at each site year to date in 2010.

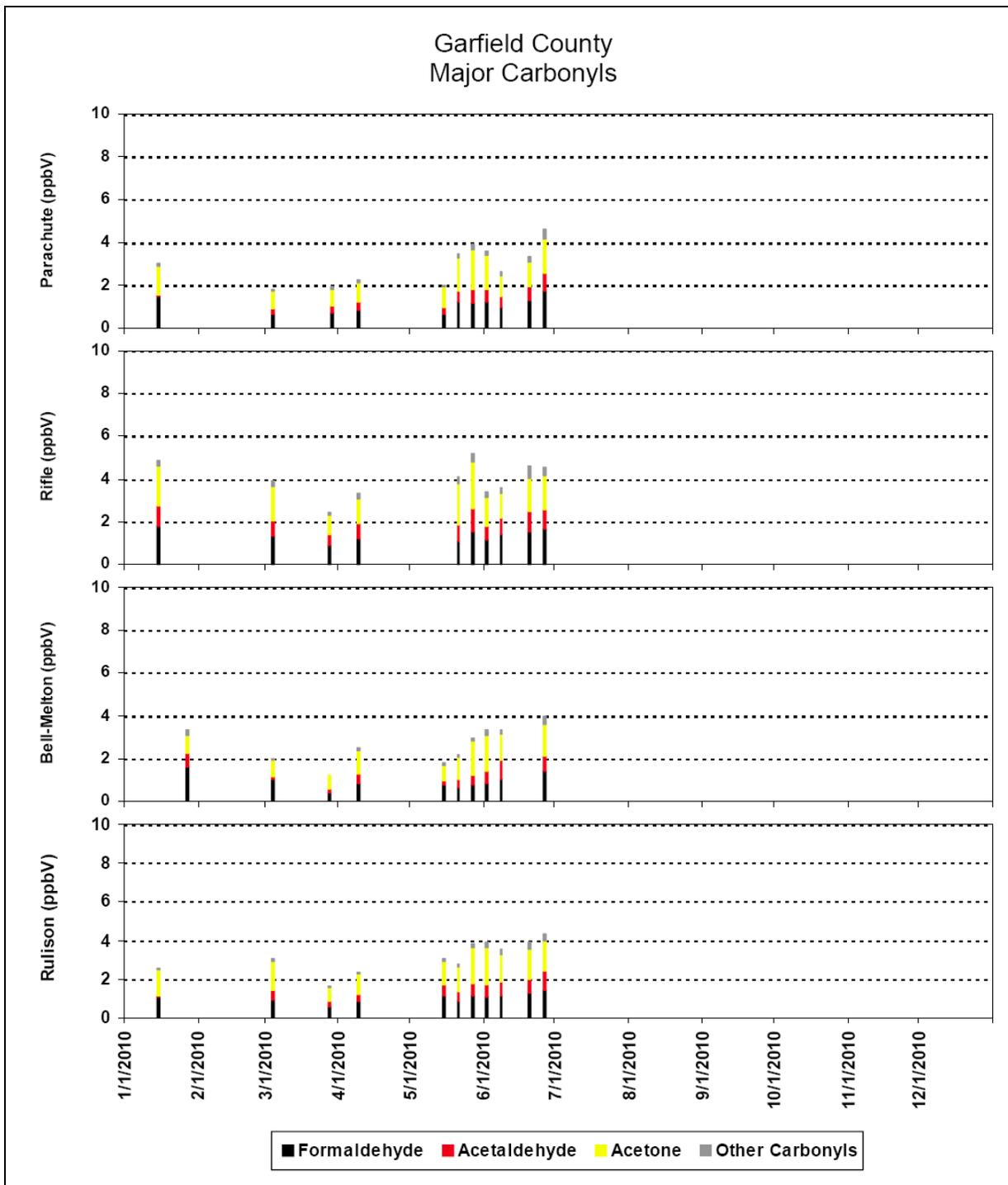


Figure 4-3. 24-Hour Major Carbonyl Compound Concentrations in Units of ppbV.

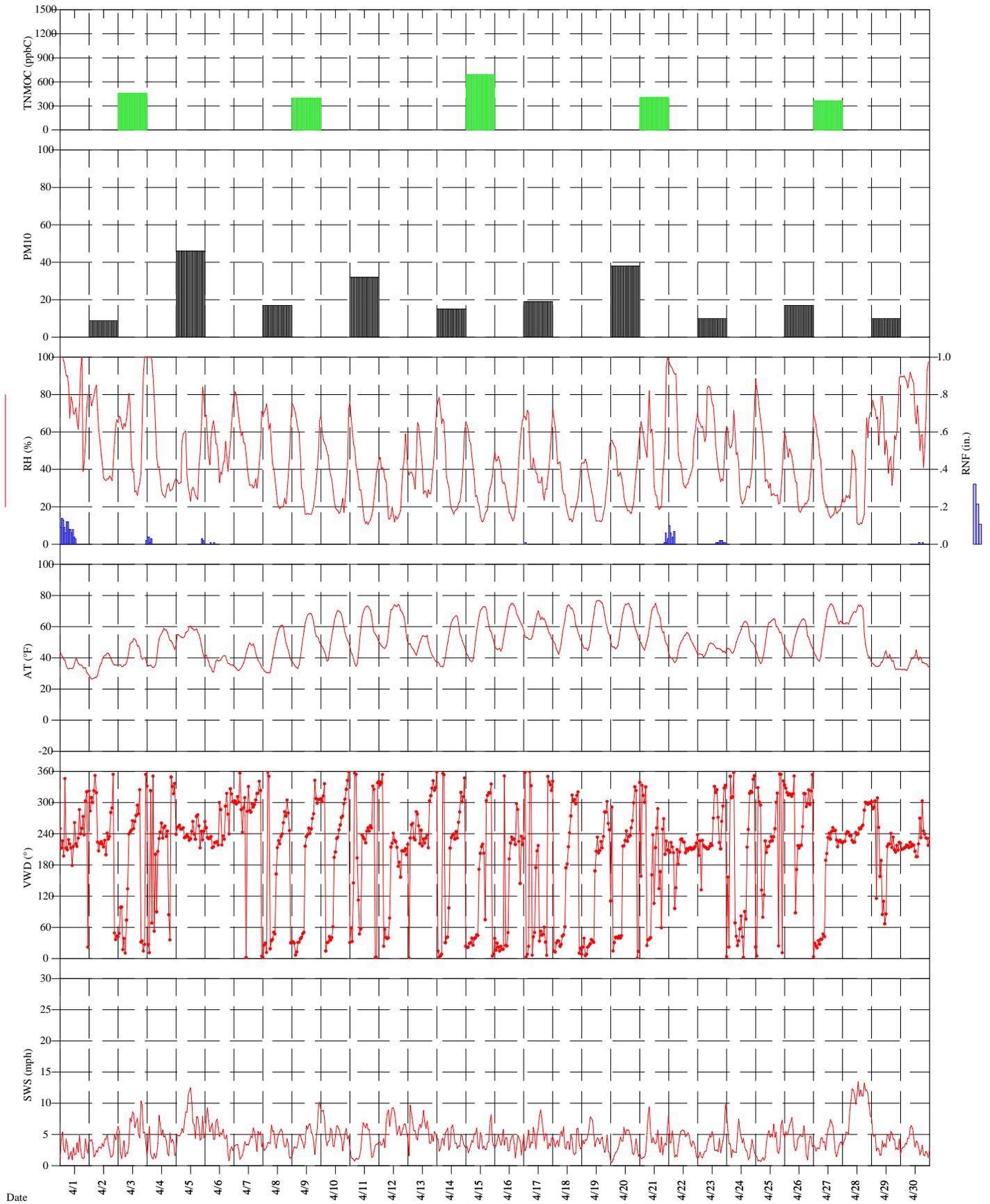
**APPENDIX A**

**Garfield County**

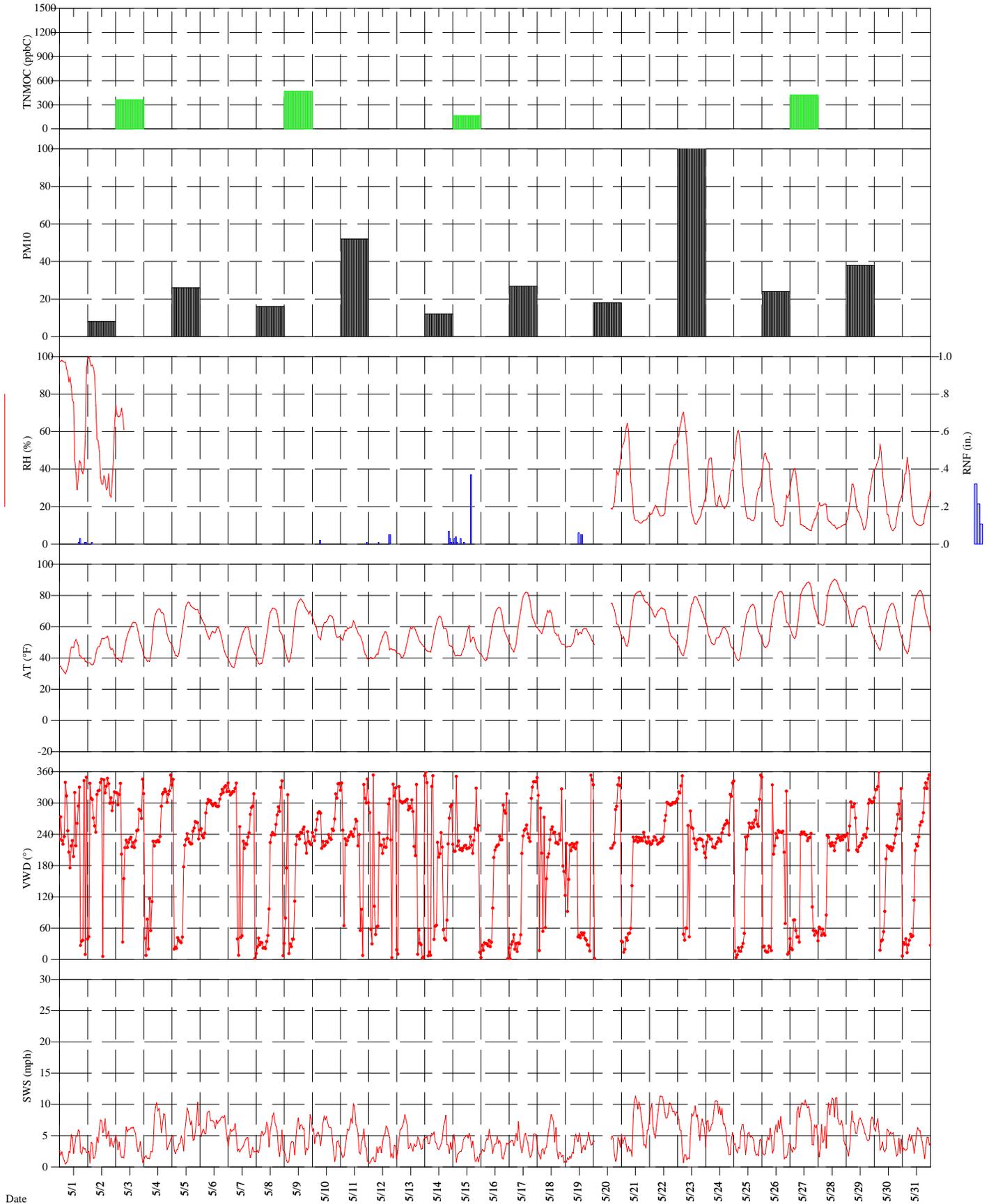
**Stackplots**

**April 1, 2010 – June 30, 2010**

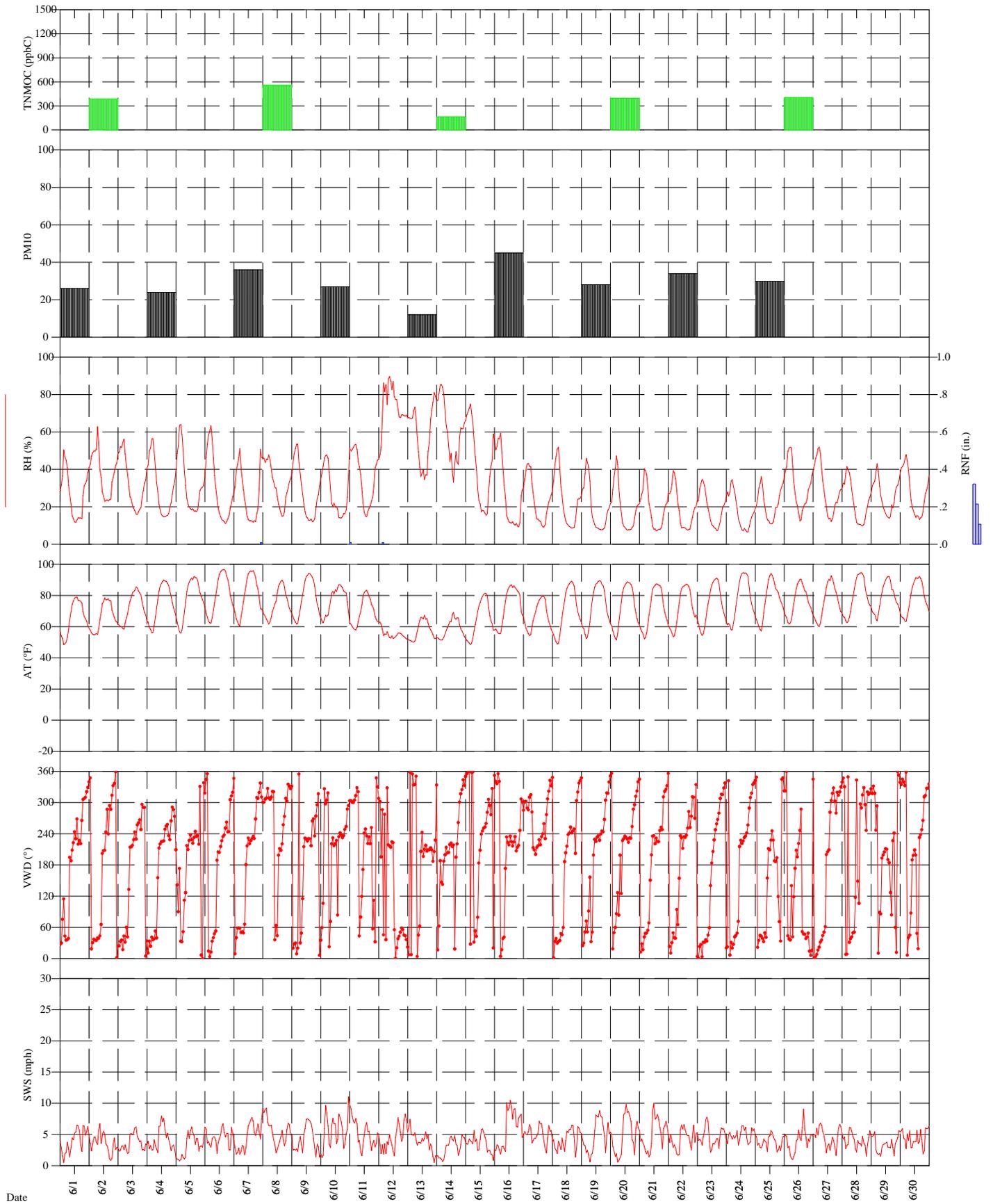
Garfield County, CO  
Parachute Site



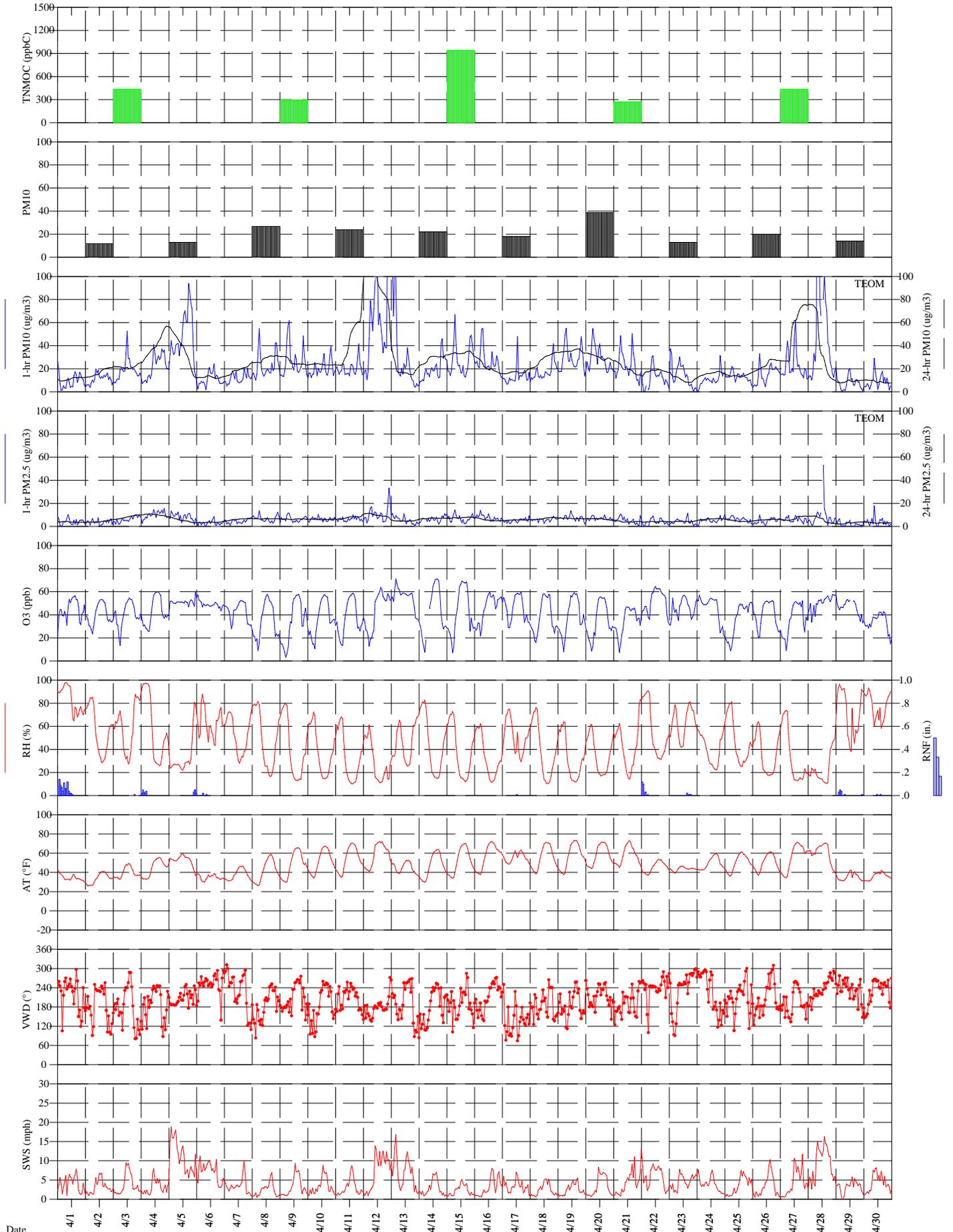
Garfield County, CO  
Parachute Site



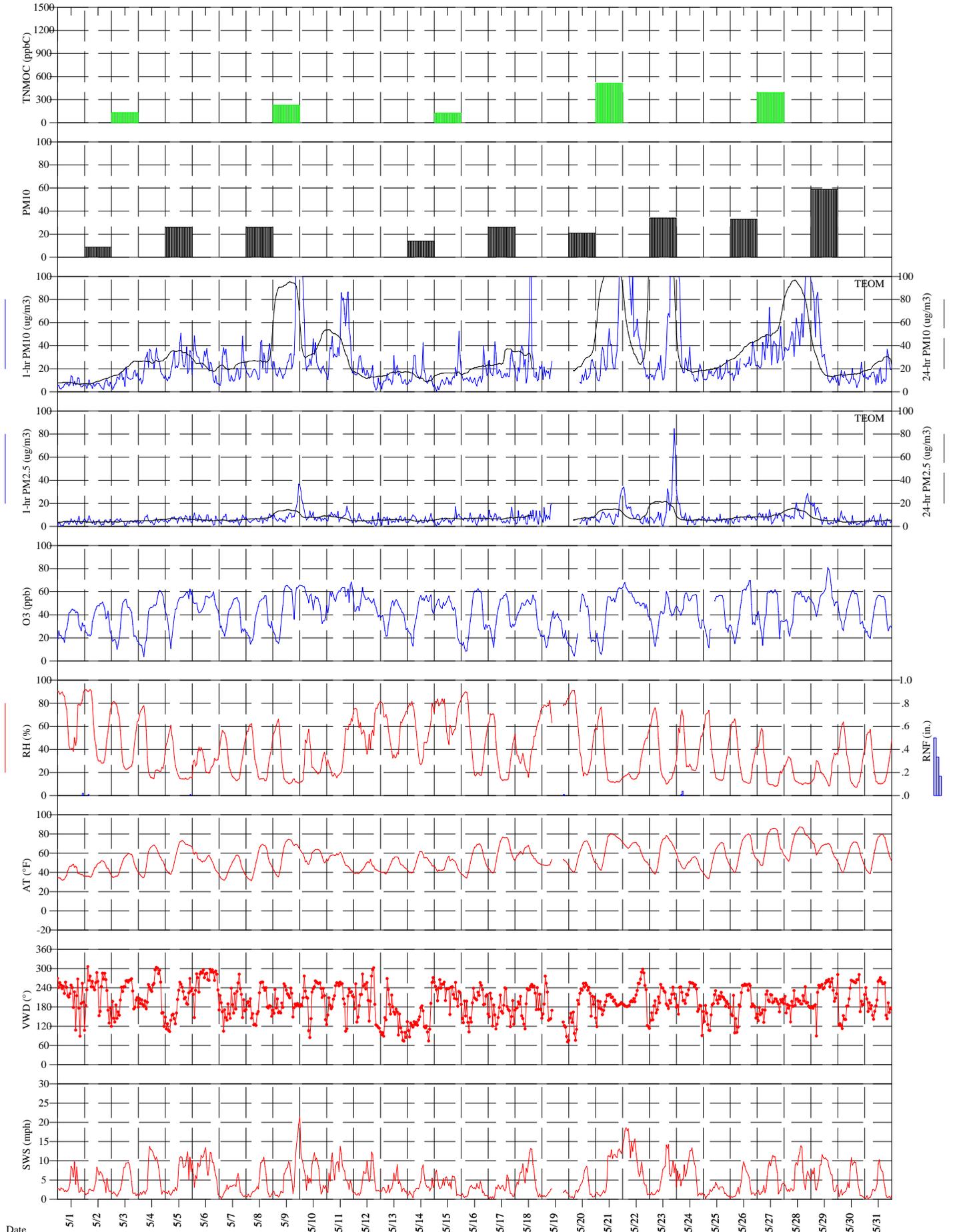
Garfield County, CO  
Parachute Site



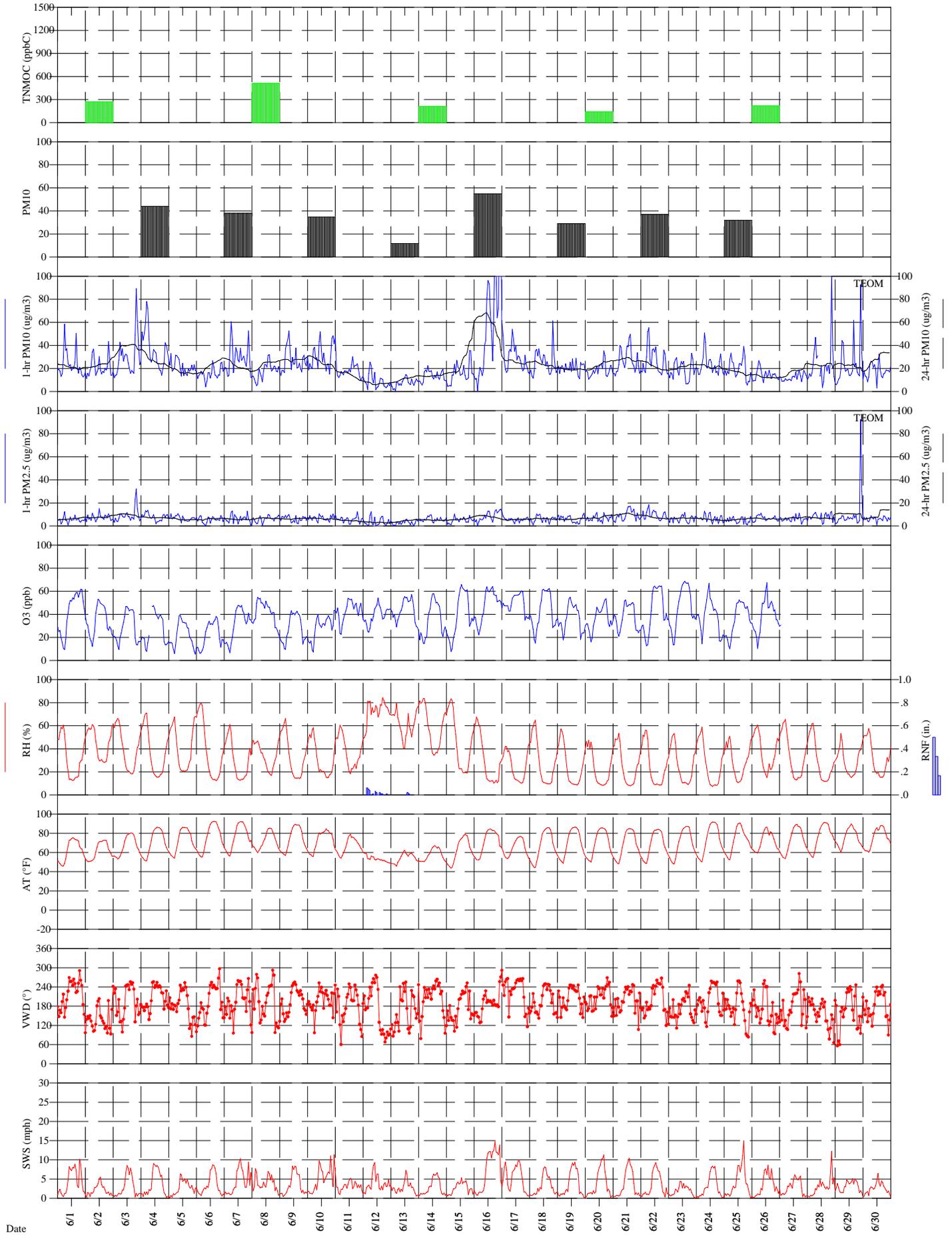
Garfield County, CO  
Rifle Site



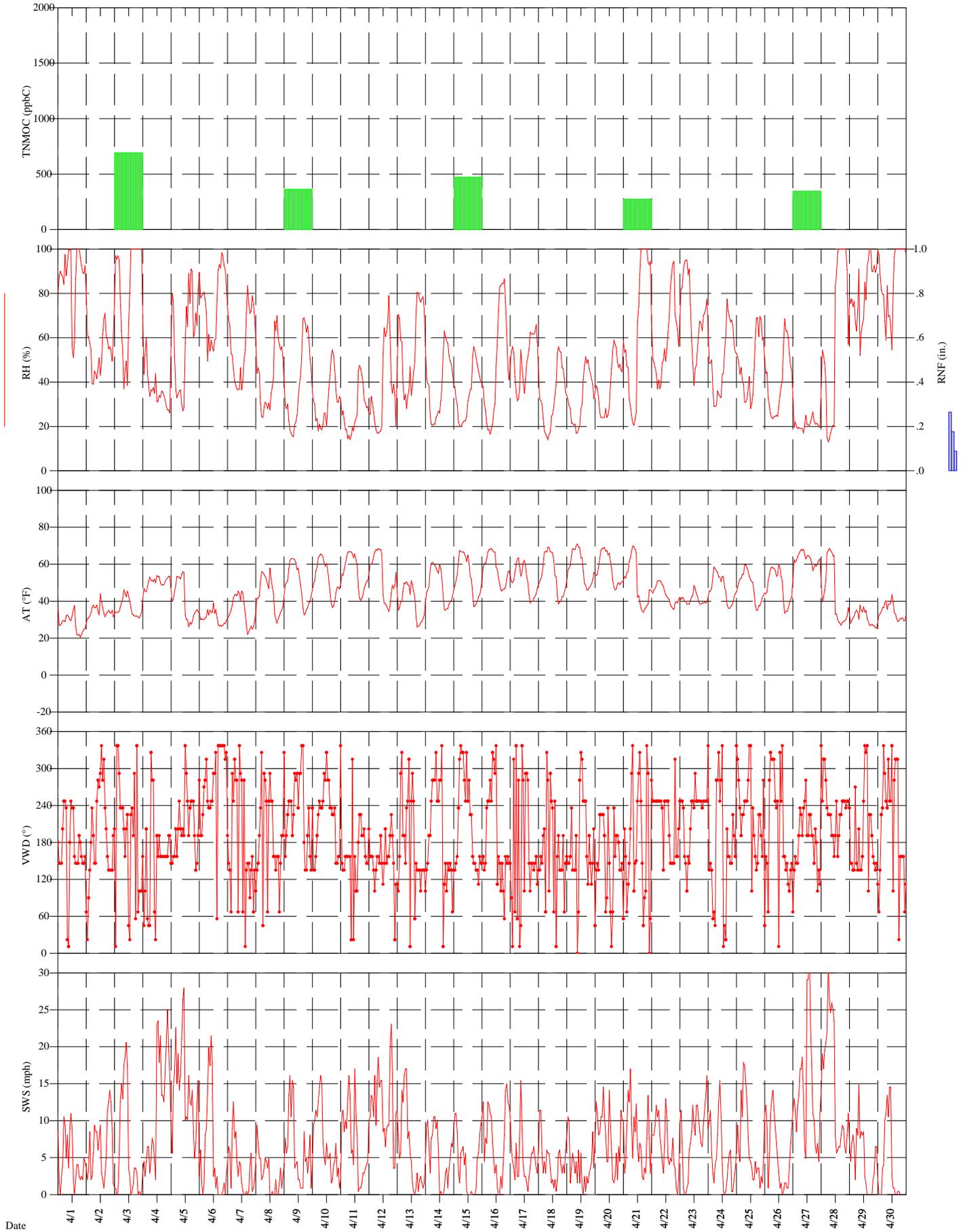
Garfield County, CO  
Rifle Site



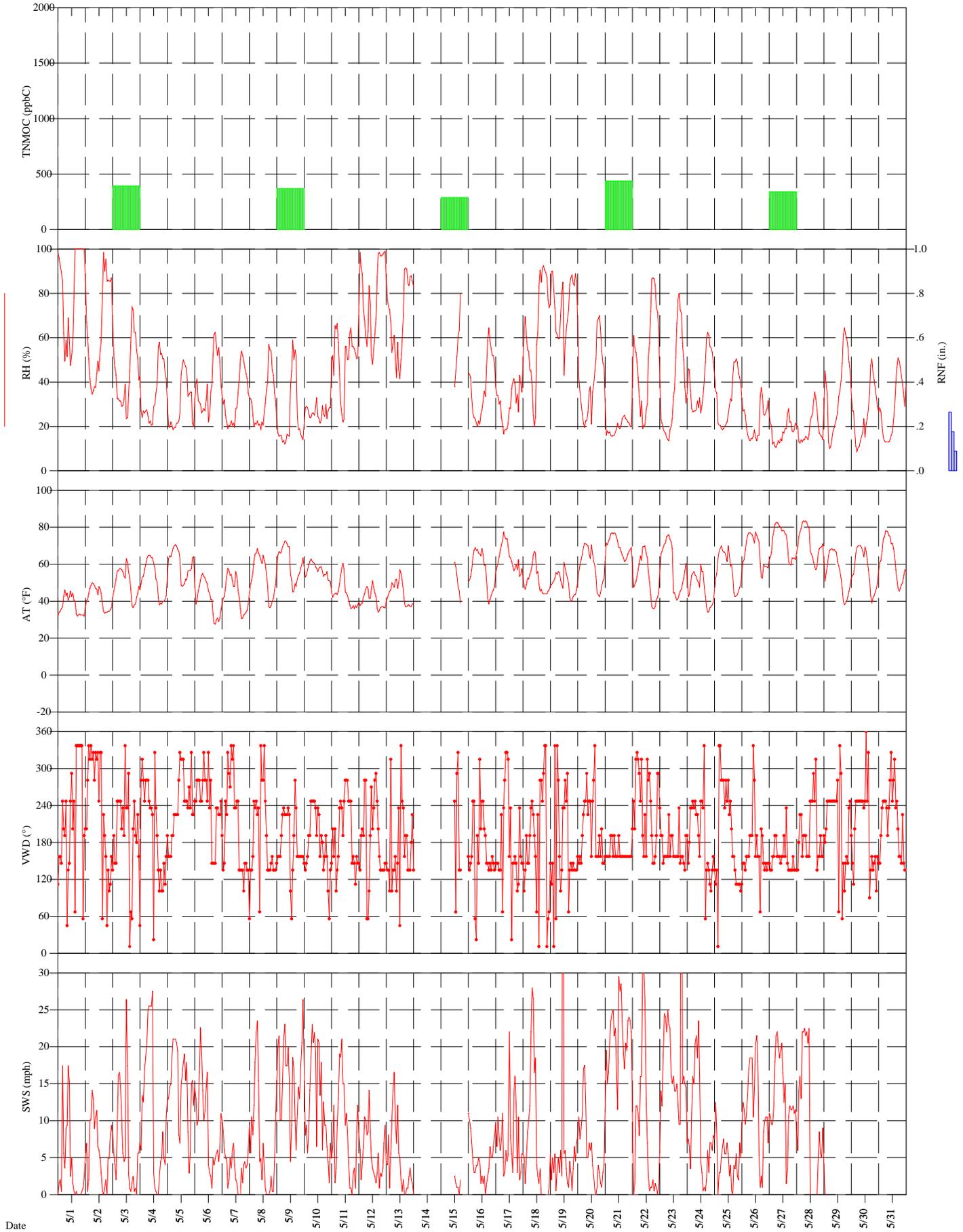
Garfield County, CO  
Rifle Site



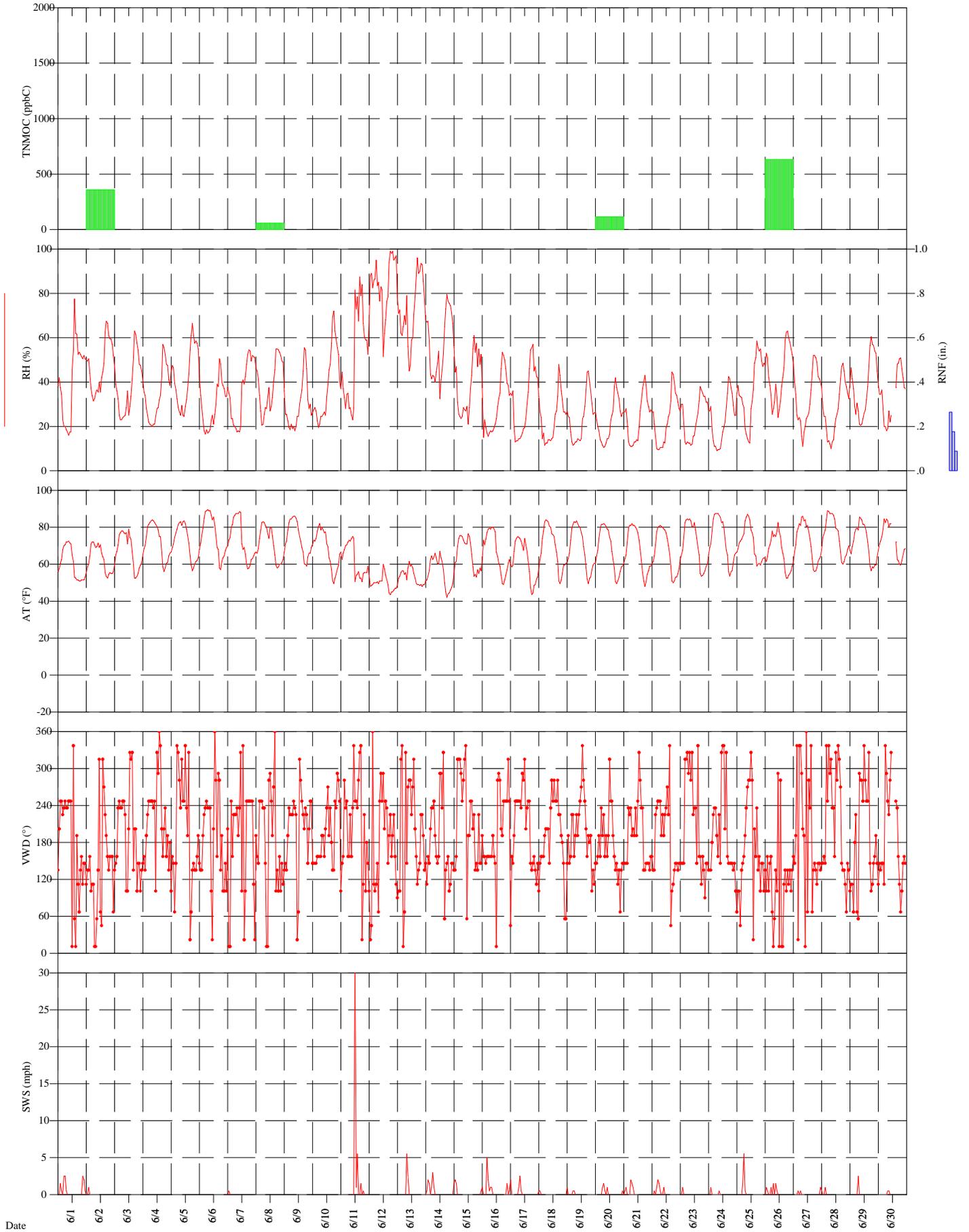
Garfield County, CO  
Bell Melton Site



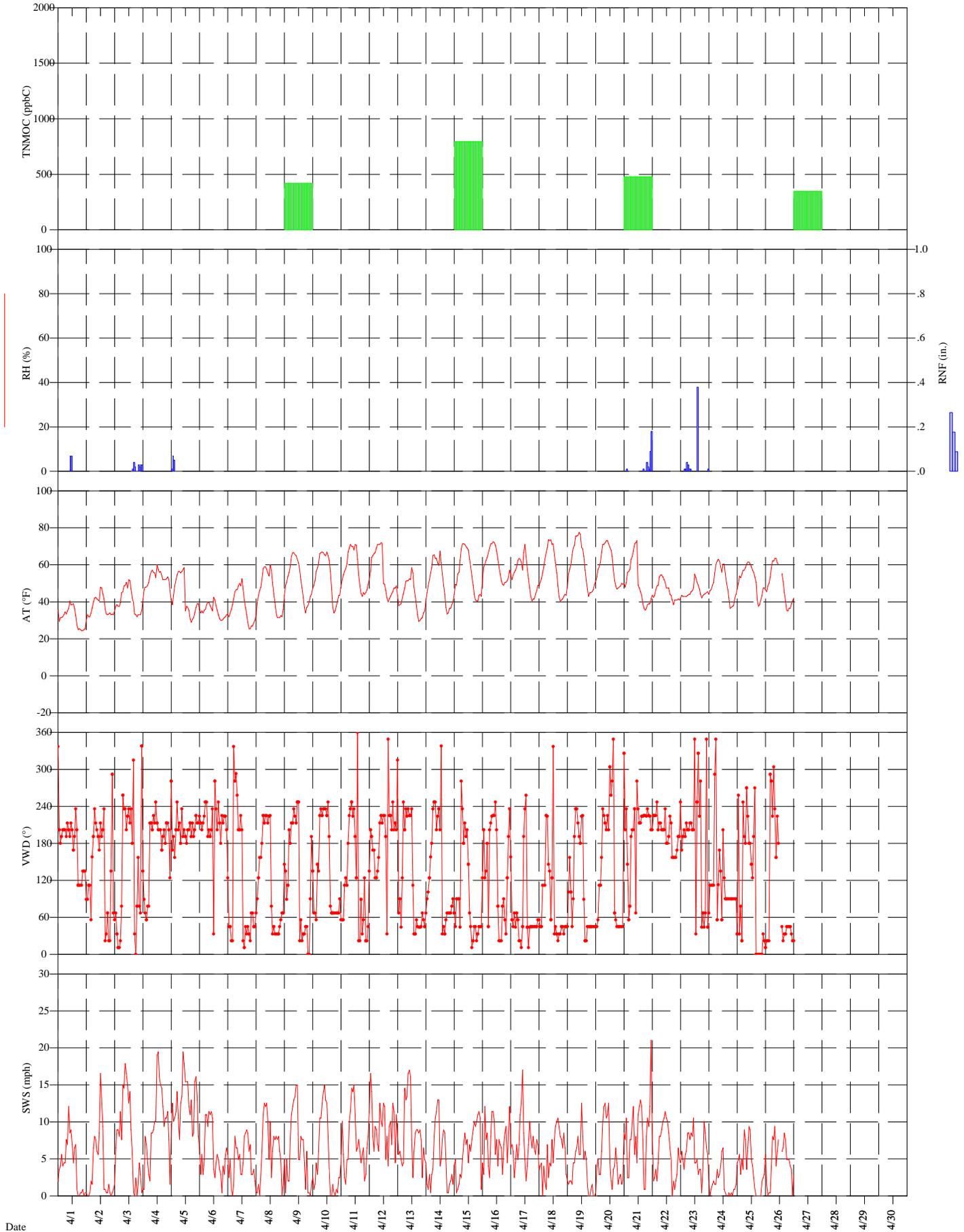
Garfield County, CO  
Bell Melton Site



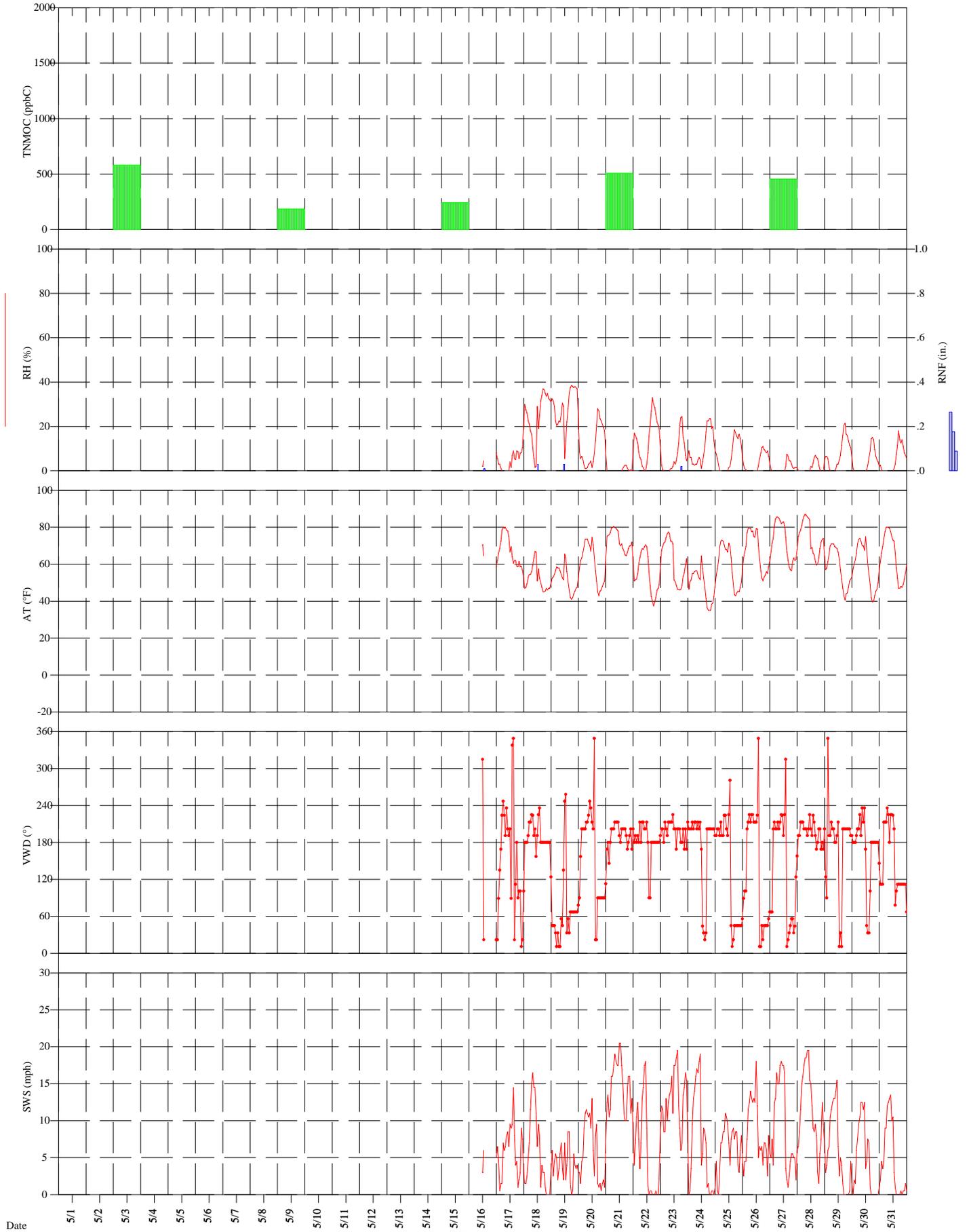
Garfield County, CO  
Bell Melton Site



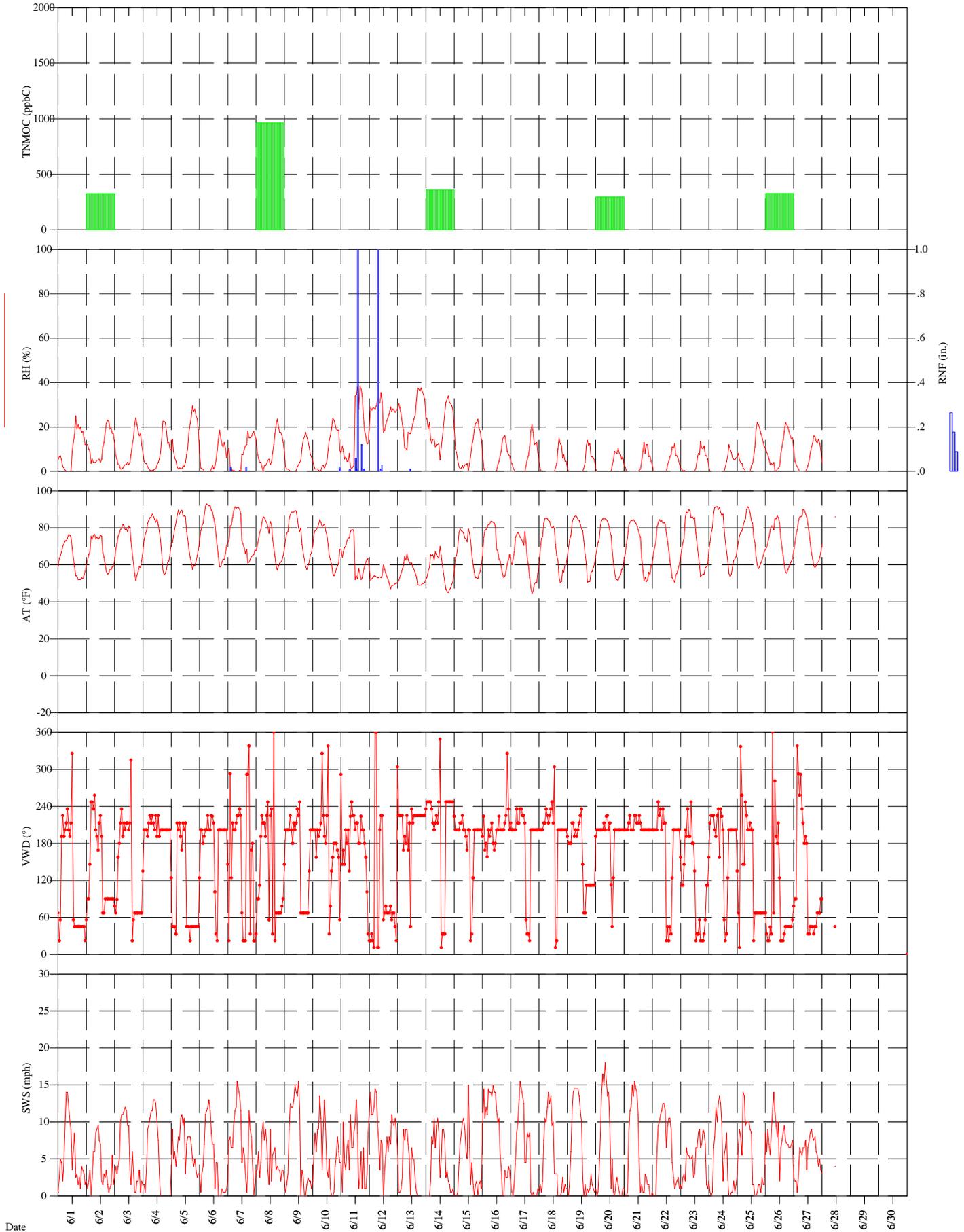
Garfield County, CO  
Rulison Site



Garfield County, CO  
Rulison Site



Garfield County, CO  
Rulison Site



**APPENDIX B**

**Garfield County**

**SNMOC Concentrations  
April 1, 2010 – June 30, 2010**

Table B-1  
Garfield County SNMOC Monitoring  
Parachute (PACO)  
1/3/2010-6/26/2010 (every sixth day)

Detected Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
1,2,3-Trimethylbenzene (526-73-8)	24	11	0.01	0.04	0.02
1,2,4-Trimethylbenzene (95-63-6)	24	23	0.04	0.17	0.09
1,3,5-Trimethylbenzene (108-67-8)	24	24	0.02	0.16	0.09
1,3-Butadiene (106-99-0)	24	1	0.04	0.04	0.03
1-Dodecene (112-41-4)	24	20	0.01	0.10	0.04
1-Heptene (592-76-7)	24	22	0.06	0.35	0.20
1-Hexene (592-41-6)	24	18	0.02	0.13	0.04
1-Nonene (124-11-8)	24	17	0.01	0.08	0.03
1-Octene (111-66-0)	24	17	0.03	0.12	0.05
1-Pentene (109-67-1)	24	23	0.03	0.22	0.06
1-Undecene (821-95-4)	24	11	0.00	0.23	0.04
2,2,3-Trimethylpentane (564-02-3)	24	15	0.04	0.12	0.05
2,2,4-Trimethylpentane (540-84-1)	24	3	0.04	0.12	0.02
2,2-Dimethylbutane (75-83-2)	24	24	0.05	0.35	0.18
2,3,4-Trimethylpentane (565-75-3)	24	19	0.01	0.04	0.02
2,3-Dimethylbutane (79-29-8)	24	22	0.07	0.62	0.27
2,3-Dimethylpentane (565-59-3)	24	24	0.07	0.27	0.18
2,4-Dimethylpentane (108-08-7)	24	22	0.04	0.18	0.10
2-Methyl-1-butene (563-46-2)	24	9	0.02	0.25	0.05
2-Methyl-2-butene (513-35-9)	24	12	0.02	0.11	0.03
2-Methylheptane (592-27-8)	24	24	0.04	0.33	0.19
2-Methylhexane (591-76-4)	24	24	0.12	0.65	0.40
2-Methylpentane (107-83-5)	24	24	0.31	2.50	1.14
3-Methylheptane (589-81-1)	24	24	0.04	0.28	0.17
3-Methylhexane (589-34-4)	24	18	0.02	0.60	0.26
3-Methylpentane (96-14-0)	24	24	0.15	1.43	0.64
4-Methyl-1-pentene (691-37-2)	24	4	0.03	0.07	0.03
Acetylene (74-86-2)	24	24	0.27	1.59	0.76
a-Pinene (80-56-8)	24	17	0.01	0.11	0.02
Benzene (71-43-2)	24	24	0.15	1.03	0.55
b-Pinene (127-91-3)	24	2	0.02	0.03	0.01
cis-2-Butene (590-18-1)	24	22	0.04	0.15	0.06
cis-2-Pentene (627-20-3)	24	17	0.02	0.05	0.03
Cyclohexane (110-82-7)	24	24	0.19	1.77	0.83
Cyclopentane (287-92-3)	24	24	0.06	0.43	0.19
Cyclopentene (142-29-0)	24	4	0.04	0.18	0.04
Ethane (74-84-0)	24	24	13.40	150.00	56.63
Ethylbenzene (100-41-4)	24	24	0.03	0.12	0.07
Ethylene (74-85-1)	24	24	0.77	2.37	1.45
Isobutane (75-28-5)	24	24	1.19	14.62	5.69
Isobutene/1-Butene (115-11-7 / 106-98-9)	24	21	0.06	3.02	0.40
Isopentane (78-78-4)	24	24	0.74	9.04	3.89

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table B-1 (continued)  
Garfield County SNMOC Monitoring  
Parachute (PACO)  
1/3/2010-6/26/2010 (every sixth day)

Detected Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
Isoprene (78-79-5)	24	19	0.02	0.40	0.08
Isopropylbenzene (98-82-8)	24	13	0.01	0.02	0.01
m-Diethylbenzene (141-93-5)	24	11	0.01	0.08	0.02
Methylcyclohexane (108-87-2)	24	24	0.37	2.80	1.61
Methylcyclopentane (96-37-7)	24	24	0.17	1.50	0.69
m-Ethyltoluene (620-14-4)	24	23	0.02	0.10	0.06
m-Xylene/p-Xylene (108-38-3 / 106-42-3)	24	24	0.11	0.92	0.53
n-Butane (106-97-8)	24	22	1.32	15.55	5.62
n-Decane (124-18-5)	24	24	0.03	0.27	0.15
n-Dodecane (112-40-3)	24	21	0.02	0.12	0.05
n-Heptane (142-82-5)	24	24	0.14	1.15	0.65
n-Hexane (110-54-3)	24	24	0.24	2.63	1.16
n-Nonane (111-84-2)	24	24	0.05	0.43	0.24
n-Octane (111-65-9)	24	24	0.11	0.84	0.47
n-Pentane (109-66-0)	24	24	0.54	6.18	2.66
n-Propylbenzene (103-65-1)	24	20	0.02	0.04	0.03
n-Tridecane (629-50-5)	24	4	0.01	0.03	0.01
n-Undecane (1120-21-4)	24	23	0.02	0.18	0.08
o-Ethyltoluene (611-14-3)	24	22	0.01	0.10	0.05
o-Xylene (95-47-6)	24	24	0.02	0.16	0.10
p-Diethylbenzene (105-05-5)	24	8	0.01	0.06	0.01
p-Ethyltoluene (622-96-8)	24	22	0.02	0.07	0.04
Propane (74-98-6)	24	24	4.80	55.00	20.56
Propylene (115-07-1)	24	24	0.19	0.60	0.36
Styrene (100-42-5)	24	7	0.01	0.21	0.04
Toluene (108-88-3)	24	24	0.20	2.56	1.07
trans-2-Butene (624-64-6)	24	22	0.02	0.44	0.07
trans-2-Hexene (4050-45-7)	24	1	0.03	0.03	0.03
trans-2-Pentene (646-04-8)	24	19	0.02	0.08	0.04

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table B-2  
Garfield County SNMOC Monitoring  
Rifle (RICO)  
1/3/2010-6/26/2010 (every sixth day)

Detected Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
1,2,3-Trimethylbenzene (526-73-8)	28	16	0.01	0.05	0.02
1,2,4-Trimethylbenzene (95-63-6)	28	28	0.03	0.29	0.10
1,3,5-Trimethylbenzene (108-67-8)	28	27	0.02	0.19	0.06
1,3-Butadiene (106-99-0)	28	11	0.02	0.20	0.05
1-Dodecene (112-41-4)	28	20	0.01	0.17	0.03
1-Heptene (592-76-7)	28	26	0.03	0.39	0.13
1-Hexene (592-41-6)	28	19	0.03	0.08	0.04
1-Nonene (124-11-8)	28	18	0.01	0.11	0.03
1-Octene (111-66-0)	28	14	0.02	0.09	0.03
1-Pentene (109-67-1)	28	28	0.04	0.16	0.08
1-Undecene (821-95-4)	28	11	0.02	0.13	0.03
2,2,3-Trimethylpentane (564-02-3)	28	17	0.02	0.09	0.03
2,2,4-Trimethylpentane (540-84-1)	28	24	0.02	0.08	0.04
2,2-Dimethylbutane (75-83-2)	28	28	0.04	0.42	0.14
2,3,4-Trimethylpentane (565-75-3)	28	26	0.01	0.05	0.03
2,3-Dimethylbutane (79-29-8)	28	26	0.07	0.74	0.22
2,3-Dimethylpentane (565-59-3)	28	28	0.06	0.32	0.17
2,4-Dimethylpentane (108-08-7)	28	27	0.03	0.21	0.08
2-Methyl-1-butene (563-46-2)	28	20	0.03	0.23	0.07
2-Methyl-1-pentene (763-29-1)	28	1	0.02	0.02	0.03
2-Methyl-2-butene (513-35-9)	28	24	0.02	0.50	0.09
2-Methylheptane (592-27-8)	28	28	0.03	0.34	0.12
2-Methylhexane (591-76-4)	28	28	0.12	0.77	0.32
2-Methylpentane (107-83-5)	28	28	0.35	2.73	1.01
3-Methylheptane (589-81-1)	28	28	0.04	0.27	0.09
3-Methylhexane (589-34-4)	28	21	0.02	0.77	0.23
3-Methylpentane (96-14-0)	28	28	0.15	1.57	0.54
4-Methyl-1-pentene (691-37-2)	28	6	0.04	0.16	0.04
Acetylene (74-86-2)	28	28	0.40	4.59	1.50
a-Pinene (80-56-8)	28	16	0.01	0.06	0.02
Benzene (71-43-2)	28	28	0.16	1.05	0.43
b-Pinene (127-91-3)	28	3	0.01	0.04	0.01
cis-2-Butene (590-18-1)	28	27	0.05	0.35	0.11
cis-2-Hexene (7688-21-3)	28	1	0.06	0.06	0.03
cis-2-Pentene (627-20-3)	28	22	0.02	0.11	0.04
Cyclohexane (110-82-7)	28	28	0.09	1.70	0.55
Cyclopentane (287-92-3)	28	28	0.07	0.49	0.20
Cyclopentene (142-29-0)	28	9	0.02	0.31	0.05
Ethane (74-84-0)	28	28	3.92	120.50	42.58
Ethylbenzene (100-41-4)	28	28	0.03	0.20	0.09
Ethylene (74-85-1)	28	28	0.98	6.05	2.19
Isobutane (75-28-5)	28	28	0.72	16.62	5.38

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table B-2 (continued)  
Garfield County SNMOC Monitoring  
Rifle (RICO)  
1/3/2010-6/26/2010 (every sixth day)

Detected Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
Isobutene/1-Butene (115-11-7 / 106-98-9)	28	28	0.10	6.65	0.95
Isopentane (78-78-4)	28	27	0.86	11.92	3.59
Isoprene (78-79-5)	28	23	0.03	0.34	0.09
Isopropylbenzene (98-82-8)	28	14	0.01	0.08	0.02
m-Diethylbenzene (141-93-5)	28	14	0.01	0.05	0.02
Methylcyclohexane (108-87-2)	28	28	0.13	2.79	0.90
Methylcyclopentane (96-37-7)	28	28	0.12	1.46	0.51
m-Ethyltoluene (620-14-4)	28	28	0.02	0.18	0.06
m-Xylene/p-Xylene (108-38-3 / 106-42-3)	28	28	0.12	1.06	0.40
n-Butane (106-97-8)	28	26	1.32	22.18	5.75
n-Decane (124-18-5)	28	28	0.02	0.27	0.09
n-Dodecane (112-40-3)	28	23	0.01	0.12	0.03
n-Heptane (142-82-5)	28	28	0.08	1.35	0.43
n-Hexane (110-54-3)	28	28	0.18	2.73	0.92
n-Nonane (111-84-2)	28	28	0.04	0.44	0.12
n-Octane (111-65-9)	28	28	0.06	0.86	0.26
n-Pentane (109-66-0)	28	28	0.64	8.58	2.86
n-Propylbenzene (103-65-1)	28	24	0.02	0.06	0.03
n-Undecane (1120-21-4)	28	25	0.01	0.17	0.06
o-Ethyltoluene (611-14-3)	28	27	0.02	0.12	0.04
o-Xylene (95-47-6)	28	28	0.04	0.27	0.12
p-Diethylbenzene (105-05-5)	28	12	0.01	0.03	0.01
p-Ethyltoluene (622-96-8)	28	24	0.02	0.11	0.04
Propane (74-98-6)	28	28	1.92	51.00	18.13
Propylene (115-07-1)	28	28	0.28	1.40	0.56
Styrene (100-42-5)	28	7	0.01	0.10	0.02
Toluene (108-88-3)	28	28	0.23	1.86	0.81
trans-2-Butene (624-64-6)	28	28	0.04	0.40	0.12
trans-2-Hexene (4050-45-7)	28	3	0.01	0.03	0.03
trans-2-Pentene (646-04-8)	28	28	0.03	0.20	0.08

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table B-3  
Garfield County SNMOC Monitoring  
Bell-Melton (BRCO)  
1/3/2010-6/26/2010 (every sixth day)

Detected Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
1,2,3-Trimethylbenzene (526-73-8)	28	8	0.01	0.08	0.01
1,2,4-Trimethylbenzene (95-63-6)	28	26	0.01	0.17	0.05
1,3,5-Trimethylbenzene (108-67-8)	28	25	0.01	0.12	0.03
1-Dodecene (112-41-4)	28	14	0.02	0.15	0.04
1-Heptene (592-76-7)	28	23	0.07	0.60	0.15
1-Hexene (592-41-6)	28	17	0.02	0.07	0.04
1-Nonene (124-11-8)	28	12	0.01	0.17	0.02
1-Octene (111-66-0)	28	13	0.02	0.04	0.03
1-Pentene (109-67-1)	28	26	0.02	0.08	0.04
1-Undecene (821-95-4)	28	10	0.01	0.42	0.04
2,2,3-Trimethylpentane (564-02-3)	28	13	0.02	0.09	0.03
2,2,4-Trimethylpentane (540-84-1)	28	11	0.01	0.14	0.03
2,2-Dimethylbutane (75-83-2)	28	28	0.02	0.59	0.17
2,3,4-Trimethylpentane (565-75-3)	28	17	0.01	0.10	0.02
2,3-Dimethylbutane (79-29-8)	28	26	0.04	1.28	0.30
2,3-Dimethylpentane (565-59-3)	28	28	0.03	0.38	0.16
2,4-Dimethylpentane (108-08-7)	28	27	0.02	0.30	0.09
2-Ethyl-1-butene (760-21-4)	28	1	0.80	0.80	0.06
2-Methyl-1-butene (563-46-2)	28	5	0.06	0.25	0.04
2-Methyl-2-butene (513-35-9)	28	7	0.03	0.08	0.03
2-Methylheptane (592-27-8)	28	28	0.01	0.35	0.11
2-Methylhexane (591-76-4)	28	28	0.05	0.98	0.33
2-Methylpentane (107-83-5)	28	28	0.02	5.50	1.33
3-Methylheptane (589-81-1)	28	28	0.02	0.21	0.07
3-Methylhexane (589-34-4)	28	21	0.01	0.91	0.20
3-Methylpentane (96-14-0)	28	28	0.03	2.93	0.69
4-Methyl-1-pentene (691-37-2)	28	6	0.02	0.10	0.04
Acetylene (74-86-2)	28	28	0.10	1.83	0.76
a-Pinene (80-56-8)	28	11	0.01	0.15	0.02
Benzene (71-43-2)	28	28	0.03	0.93	0.34
b-Pinene (127-91-3)	28	3	0.01	0.03	0.01
cis-2-Butene (590-18-1)	28	20	0.03	0.42	0.05
cis-2-Pentene (627-20-3)	28	11	0.02	0.04	0.02
Cyclohexane (110-82-7)	28	28	0.03	3.20	0.77
Cyclopentane (287-92-3)	28	28	0.03	0.85	0.23
Cyclopentene (142-29-0)	28	6	0.02	0.34	0.05
Ethane (74-84-0)	28	28	0.88	274.50	64.36
Ethylbenzene (100-41-4)	28	27	0.02	0.21	0.05
Ethylene (74-85-1)	28	28	0.61	1.96	1.25
Isobutane (75-28-5)	28	28	0.13	36.25	8.56
Isobutene/1-Butene (115-11-7 / 106-98-9)	28	24	0.05	5.92	0.85
Isopentane (78-78-4)	28	28	0.08	20.60	5.01

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table B-3 (continued)  
Garfield County SNMOC Monitoring  
Bell-Melton (BRCO)  
1/3/2010-6/26/2010 (every sixth day)

Detected Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
Isoprene (78-79-5)	28	21	0.02	0.59	0.08
Isopropylbenzene (98-82-8)	28	11	0.01	0.07	0.02
m-Diethylbenzene (141-93-5)	28	11	0.01	0.16	0.02
Methylcyclohexane (108-87-2)	28	28	0.04	4.37	1.11
Methylcyclopentane (96-37-7)	28	28	0.03	2.70	0.66
m-Ethyltoluene (620-14-4)	28	25	0.02	0.08	0.03
m-Xylene/p-Xylene (108-38-3 / 106-42-3)	28	28	0.04	1.82	0.26
n-Butane (106-97-8)	28	26	0.15	40.50	9.32
n-Decane (124-18-5)	28	26	0.02	0.30	0.06
n-Dodecane (112-40-3)	28	20	0.00	0.10	0.03
n-Heptane (142-82-5)	28	28	0.03	1.79	0.50
n-Hexane (110-54-3)	28	28	0.04	6.15	1.36
n-Nonane (111-84-2)	28	28	0.01	0.34	0.10
n-Octane (111-65-9)	28	28	0.03	0.79	0.23
n-Pentane (109-66-0)	28	28	0.08	15.46	3.77
n-Propylbenzene (103-65-1)	28	15	0.01	0.07	0.02
n-Tridecane (629-50-5)	28	1	0.09	0.09	0.01
n-Undecane (1120-21-4)	28	26	0.02	0.15	0.04
o-Ethyltoluene (611-14-3)	28	23	0.01	0.07	0.02
o-Xylene (95-47-6)	28	27	0.02	0.21	0.05
p-Diethylbenzene (105-05-5)	28	6	0.01	0.07	0.01
p-Ethyltoluene (622-96-8)	28	18	0.01	0.06	0.02
Propane (74-98-6)	28	28	0.68	129.67	30.68
Propylene (115-07-1)	28	28	0.13	0.74	0.29
Styrene (100-42-5)	28	7	0.01	0.07	0.02
Toluene (108-88-3)	28	28	0.03	1.69	0.53
trans-2-Butene (624-64-6)	28	23	0.02	0.95	0.10
trans-2-Pentene (646-04-8)	28	15	0.02	0.08	0.03

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table B-4  
Garfield County SNMOC Monitoring  
Rulison (RUCO)  
1/3/2010-6/26/2010 (every sixth day)

Detected Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
1,2,3-Trimethylbenzene (526-73-8)	27	7	0.01	0.03	0.01
1,2,4-Trimethylbenzene (95-63-6)	27	27	0.03	0.14	0.07
1,3,5-Trimethylbenzene (108-67-8)	27	27	0.03	0.12	0.06
1,3-Butadiene (106-99-0)	27	2	0.04	0.08	0.03
1-Decene (872-05-9)	27	1	0.05	0.05	0.01
1-Dodecene (112-41-4)	27	19	0.01	0.09	0.02
1-Heptene (592-76-7)	27	25	0.06	0.41	0.20
1-Hexene (592-41-6)	27	16	0.02	0.06	0.03
1-Nonene (124-11-8)	27	11	0.01	0.05	0.02
1-Octene (111-66-0)	27	21	0.03	0.10	0.05
1-Pentene (109-67-1)	27	26	0.02	0.06	0.04
1-Undecene (821-95-4)	27	11	0.02	0.13	0.03
2,2,3-Trimethylpentane (564-02-3)	27	18	0.02	0.09	0.04
2,2,4-Trimethylpentane (540-84-1)	27	5	0.03	0.33	0.03
2,2-Dimethylbutane (75-83-2)	27	27	0.09	0.46	0.22
2,3,4-Trimethylpentane (565-75-3)	27	14	0.01	0.03	0.01
2,3-Dimethylbutane (79-29-8)	27	25	0.13	0.82	0.35
2,3-Dimethylpentane (565-59-3)	27	27	0.08	0.32	0.19
2,4-Dimethylpentane (108-08-7)	27	27	0.04	0.20	0.11
2-Ethyl-1-butene (760-21-4)	27	1	1.45	1.45	0.08
2-Methyl-1-butene (563-46-2)	27	7	0.02	0.88	0.07
2-Methyl-2-butene (513-35-9)	27	9	0.02	0.13	0.03
2-Methylheptane (592-27-8)	27	27	0.06	0.34	0.18
2-Methylhexane (591-76-4)	27	27	0.13	0.77	0.43
2-Methylpentane (107-83-5)	27	27	0.39	2.97	1.43
3-Methylheptane (589-81-1)	27	27	0.05	0.27	0.14
3-Methylhexane (589-34-4)	27	20	0.02	0.82	0.29
3-Methylpentane (96-14-0)	27	27	0.22	1.68	0.78
4-Methyl-1-pentene (691-37-2)	27	6	0.02	0.13	0.03
Acetylene (74-86-2)	27	27	0.18	1.50	0.64
a-Pinene (80-56-8)	27	14	0.01	0.06	0.02
Benzene (71-43-2)	27	27	0.19	0.92	0.52
b-Pinene (127-91-3)	27	1	0.03	0.03	0.01
cis-2-Butene (590-18-1)	27	20	0.03	0.07	0.04
cis-2-Pentene (627-20-3)	27	13	0.02	0.04	0.02
Cyclohexane (110-82-7)	27	27	0.26	2.08	1.02
Cyclopentane (287-92-3)	27	27	0.08	0.53	0.24
Cyclopentene (142-29-0)	27	5	0.02	0.14	0.03
Ethane (74-84-0)	27	27	13.05	153.50	64.82
Ethylbenzene (100-41-4)	27	27	0.03	0.09	0.06
Ethylene (74-85-1)	27	27	0.69	1.91	1.22
Isobutane (75-28-5)	27	27	1.91	20.10	8.18

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table B-4 (continued)  
Garfield County SNMOC Monitoring  
Rulison (RUCO)  
1/3/2010-6/26/2010 (every sixth day)

Detected Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
Isobutene/1-Butene (115-11-7 / 106-98-9)	27	25	0.07	3.85	0.62
Isopentane (78-78-4)	27	27	1.18	12.42	5.01
Isoprene (78-79-5)	27	19	0.03	0.42	0.08
Isopropylbenzene (98-82-8)	27	12	0.01	0.05	0.01
m-Diethylbenzene (141-93-5)	27	13	0.01	0.13	0.02
Methylcyclohexane (108-87-2)	27	27	0.50	3.31	1.73
Methylcyclopentane (96-37-7)	27	27	0.25	1.68	0.83
m-Ethyltoluene (620-14-4)	27	27	0.02	0.09	0.04
m-Xylene/p-Xylene (108-38-3 / 106-42-3)	27	27	0.14	0.78	0.40
n-Butane (106-97-8)	27	25	1.98	21.28	8.14
n-Decane (124-18-5)	27	27	0.04	0.20	0.10
n-Dodecane (112-40-3)	27	24	0.01	0.05	0.03
n-Heptane (142-82-5)	27	27	0.18	1.41	0.71
n-Hexane (110-54-3)	27	27	0.37	3.13	1.48
n-Nonane (111-84-2)	27	27	0.06	0.34	0.17
n-Octane (111-65-9)	27	27	0.12	0.82	0.42
n-Pentane (109-66-0)	27	27	0.96	8.60	3.58
n-Propylbenzene (103-65-1)	27	19	0.01	0.04	0.02
n-Tridecane (629-50-5)	27	2	0.00	0.01	0.01
n-Undecane (1120-21-4)	27	27	0.03	0.11	0.06
o-Ethyltoluene (611-14-3)	27	26	0.02	0.08	0.03
o-Xylene (95-47-6)	27	27	0.03	0.13	0.08
p-Diethylbenzene (105-05-5)	27	8	0.01	0.07	0.01
p-Ethyltoluene (622-96-8)	27	23	0.02	0.06	0.03
Propane (74-98-6)	27	27	6.07	67.33	27.41
Propylene (115-07-1)	27	27	0.20	0.51	0.30
Styrene (100-42-5)	27	6	0.01	0.08	0.02
Toluene (108-88-3)	27	27	0.26	1.70	0.86
trans-2-Butene (624-64-6)	27	18	0.02	0.15	0.03
trans-2-Pentene (646-04-8)	27	15	0.02	0.04	0.02

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

**APPENDIX C**

**Garfield County**

**Carbonyl Concentrations  
April 1, 2010 – June 30, 2010**

Table C-1  
Garfield County Carbonyl Monitoring  
Bell-Melton (BRCO)  
1/27/2010-6/26/2010 (every twelfth day)

Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
2,5-Dimethylbenzaldehyde (5779-94-2)	10	0	ND	ND	0.00
Acetaldehyde (75-07-0)	10	10	0.11	0.92	0.47
Acetone (67-64-1)	10	10	0.61	1.72	1.10
Benzaldehyde (100-52-7)	10	10	0.01	0.06	0.02
Butyraldehyde (123-72-8)	10	10	0.01	0.09	0.04
Crotonaldehyde (123-73-9)	10	9	0.01	0.12	0.03
Formaldehyde (50-00-0)	10	10	0.40	1.62	0.93
Hexaldehyde (66-25-1)	10	8	0.01	0.03	0.01
Isovaleraldehyde (590-86-3)	10	0	ND	ND	0.00
Propionaldehyde (123-38-6)	10	8	0.02	0.07	0.04
Tolualdehydes (NA)	10	9	0.01	0.03	0.02
Valeraldehyde (110-62-3)	10	7	0.01	0.02	0.01

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table C-2  
Garfield County Carbonyl Monitoring  
Parachute (PACO)  
1/15/2010-6/26/2010 (every twelfth day)

Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
2,5-Dimethylbenzaldehyde (5779-94-2)	11	0	ND	ND	0.00
Acetaldehyde (75-07-0)	11	11	0.09	0.86	0.46
Acetone (67-64-1)	11	11	0.76	1.84	1.23
Benzaldehyde (100-52-7)	11	11	0.01	0.09	0.03
Butyraldehyde (123-72-8)	11	11	0.02	0.08	0.04
Crotonaldehyde (123-73-9)	11	11	0.01	0.09	0.03
Formaldehyde (50-00-0)	11	11	0.62	1.71	1.08
Hexaldehyde (66-25-1)	11	10	0.01	0.03	0.01
Isovaleraldehyde (590-86-3)	11	0	ND	ND	0.00
Propionaldehyde (123-38-6)	11	10	0.01	0.09	0.04
Tolualdehydes (NA)	11	11	0.01	0.05	0.02
Valeraldehyde (110-62-3)	11	7	0.01	0.02	0.01

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table C-3  
Garfield County Carbonyl Monitoring  
Rifle (RICO)  
1/15/2010-6/26/2010 (every twelfth day)

Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
2,5-Dimethylbenzaldehyde (5779-94-2)	10	0	ND	ND	0.00
Acetaldehyde (75-07-0)	10	10	0.52	1.06	0.80
Acetone (67-64-1)	10	10	0.93	2.19	1.52
Benzaldehyde (100-52-7)	10	10	0.02	0.08	0.04
Butyraldehyde (123-72-8)	10	9	0.03	0.12	0.06
Crotonaldehyde (123-73-9)	10	10	0.02	0.12	0.06
Formaldehyde (50-00-0)	10	10	0.88	1.79	1.36
Hexaldehyde (66-25-1)	10	10	0.01	0.06	0.03
Isovaleraldehyde (590-86-3)	10	1	0.07	0.07	0.01
Propionaldehyde (123-38-6)	10	9	0.01	0.14	0.07
Tolualdehydes (NA)	10	10	0.02	0.09	0.04
Valeraldehyde (110-62-3)	10	10	0.01	0.04	0.02

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.

Table C-5  
 Garfield County Carbonyl Monitoring  
 Rulison (RUCO)  
 1/15/2010-6/26/2010 (every twelfth day)

Compound (CAS Number)	Sample Count		Concentration (ppbV)		
	# Samples	# Detects	Minimum	Maximum	Average*
2,5-Dimethylbenzaldehyde (5779-94-2)	11	0	ND	ND	0.00
Acetaldehyde (75-07-0)	11	11	0.09	0.99	0.55
Acetone (67-64-1)	11	11	0.70	1.92	1.40
Benzaldehyde (100-52-7)	11	11	0.01	0.05	0.02
Butyraldehyde (123-72-8)	11	11	0.01	0.06	0.04
Crotonaldehyde (123-73-9)	11	11	0.01	0.12	0.05
Formaldehyde (50-00-0)	11	11	0.58	1.45	1.03
Hexaldehyde (66-25-1)	11	11	0.00	0.03	0.02
Isovaleraldehyde (590-86-3)	11	0	ND	ND	0.00
Propionaldehyde (123-38-6)	11	10	0.01	0.09	0.04
Tolualdehydes (NA)	11	10	0.01	0.04	0.02
Valeraldehyde (110-62-3)	11	7	0.01	0.02	0.01

\*Samples reported as non-detects (ND) were included in averages as 1/2 minimum detection limits.