Exceptional Events Demonstration for Ozone Exceedances in Washoe County, Nevada from the Trailhead Fire on July 2 through July 4, 2016

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Prepared by:

Washoe County Health District
Air Quality Management Division
P.O. Box 11130
Reno, Nevada 89520-0027
(775) 784-7200
OurCleanAir.com

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ACRONYMS

AQI	Air Quality Index
AQMD	Washoe County Health District - Air Quality Management Division
AQS	Air Quality System
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
EC	Elemental Carbon
EE	Exceptional Event
EER	Exceptional Events Rule
EPA	U.S. Environmental Protection Agency
ºF	Degrees Fahrenheit
FR	Final Rule
HA 87	Hydrographic Area 87
HMS	Hazardous Mapping System
HYSPLIT	Hybrid Single-Particle Lagrangian Integrated Trajectory
km	Kilometers
$\mu g/m^3$	Micrograms per cubic meter
NAAQS	National Ambient Air Quality Standards
NCore	National Core Multi-Pollutant Monitoring Station
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NWS	National Weather Service
OC	Organic Carbon
O_3	Ozone
PST	Pacific Standard Time
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter less than or equal to 2.5 microns in aerodynamic diameter
PM_{10}	Particulate Matter less than or equal to 10 microns in aerodynamic diameter
ppm	Parts Per Million
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur Dioxide
TSP	Total Suspended Particles
UTC	Coordinated Universal Time
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

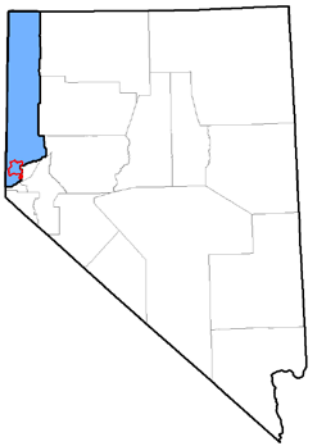
1.0 NARRATIVE CONCEPTUAL MODEL

1.1 Regional Description

Washoe County is located in the northwest portion of Nevada. It is bounded by California, Oregon, and the Nevada counties of Humboldt, Pershing, Storey, Churchill, Lyon, and Carson City (Figure 1.1). The Truckee Meadows is approximately 200 square miles in size and situated in the southern portion of Washoe County. It is geographically identified as Hydrographic Area 87 (HA 87) as defined by the State of Nevada, Division of Water Resources. Most of Washoe County's population lives in and around the Truckee Meadows.

The Truckee Meadows sits at an elevation of 4,400 feet above sea level and surrounded by mountain ranges. To the west, the Sierras rise to elevations of 9,000 to 11,000 feet. Hills to the east reach 6,000 to 7,000 feet. The Truckee River, flowing from the Sierras eastward, drains into Pyramid Lake to the northeast of the Truckee Meadows.

Figure 1.1
Washoe County, Nevada



Climate

Average annual wind speed measured at the Reno-Tahoe International Airport is 6.4 miles per hour (mph). January is the calmest month (4.5 mph) with April being the windiest (8.3 mph). Wintertime (November-January) averages 4.9 mph and summertime (June-August) averages 7.2 mph.

Most of Reno's precipitation falls from November through March in the form of rain and snow. Reno receives an average of 7.40 inches of precipitation per calendar year (1981-2010 climate normals). Table 1.1 lists temperature and precipitation normals as measured at the Reno-Tahoe International Airport.

Table 1.1: Monthly Normal Temperature and Rainfall (1981-2010)

	Temperature (^{o}F)			Precipitation (inches)
Month	Maximum	Minimum	Mean	Mean
January	45.7	25.4	35.6	1.03
February	51.0	28.9	39.9	1.02
March	57.9	33.5	45.7	0.76
April	63.9	37.8	50.9	0.47
May	73.5	45.5	59.5	0.49
June	83.3	52.0	67.7	0.51
July	92.2	57.7	74.9	0.18
August	90.6	55.8	73.2	0.23
September	82.0	48.5	65.2	0.35
October	69.2	38.8	54.0	0.51
November	55.0	30.5	42.7	0.82
December	45.6	25.0	35.3	1.03

Maximum temperatures of 90 ^{o}F or above normally occur between July 3 and August 21. Maximum temperatures typically peak at 94 ^{o}F between July 22 and July 29.

Demographics

The 2016 population of Washoe County was 448,316. Approximately two-thirds of Washoe County's residents live in the Truckee Meadows, which includes the cities of Reno and Sparks. Anthropogenic activities such as transportation, manufacturing, freight distribution, and residential wood use are also concentrated in the Truckee Meadows.

Seasons

Washoe County experiences two distinct air pollution seasons - wintertime particulate matter (PM) and summertime ozone (O_3). Wildfire smoke throughout the year, especially during the summer months, can dramatically increase summertime PM and O_3.

Wintertime temperature inversions combined with light winds can contribute to elevated levels of Particulate Matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$), Particulate Matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}), Nitrogen Dioxide (NO_2), and Carbon Monoxide (CO). Inversions are common in mountain valleys such as the Truckee Meadows. Air pollution episodes persist until stronger winds scour the cold air out of the valley and break the temperature inversion.

Northern Nevada receives an abundant amount of sunshine and solar radiation during the summer months. Mobile sources (i.e., cars and trucks) emit O_3 precursors and their activity increases during the summer. Ozone concentrations are typically highest between May and September, especially during the months of June, July, and August.

Strong winds can occur at any time of year. Two-minute gusts over 40 mph are not uncommon. These winds lower the gaseous pollutant (O_3, CO, NO_2, and SO_2) concentrations but typically increase PM levels, especially PM_{10}. Hourly PM_{10} levels can reach more than 500 micrograms per cubic meter ($\mu g/m^3$) for several hours.

Attainment Status

All areas of Washoe County currently attain the National Ambient Air Quality Standards (NAAQS) for all pollutants and averaging times. However, portions of Washoe County have been designated non-attainment for the following NAAQS: 1) 1971 Total Suspended Particles (TSP) (24-hour and Annual); 2) CO (8-hour); 3) 1979 O_3 (1-hour); and 4) 1987 PM_{10} (24-hour and Annual). Control strategies since the 1970's targeting mobile sources, woodstoves, and dust control have reduced emissions and improved air quality.

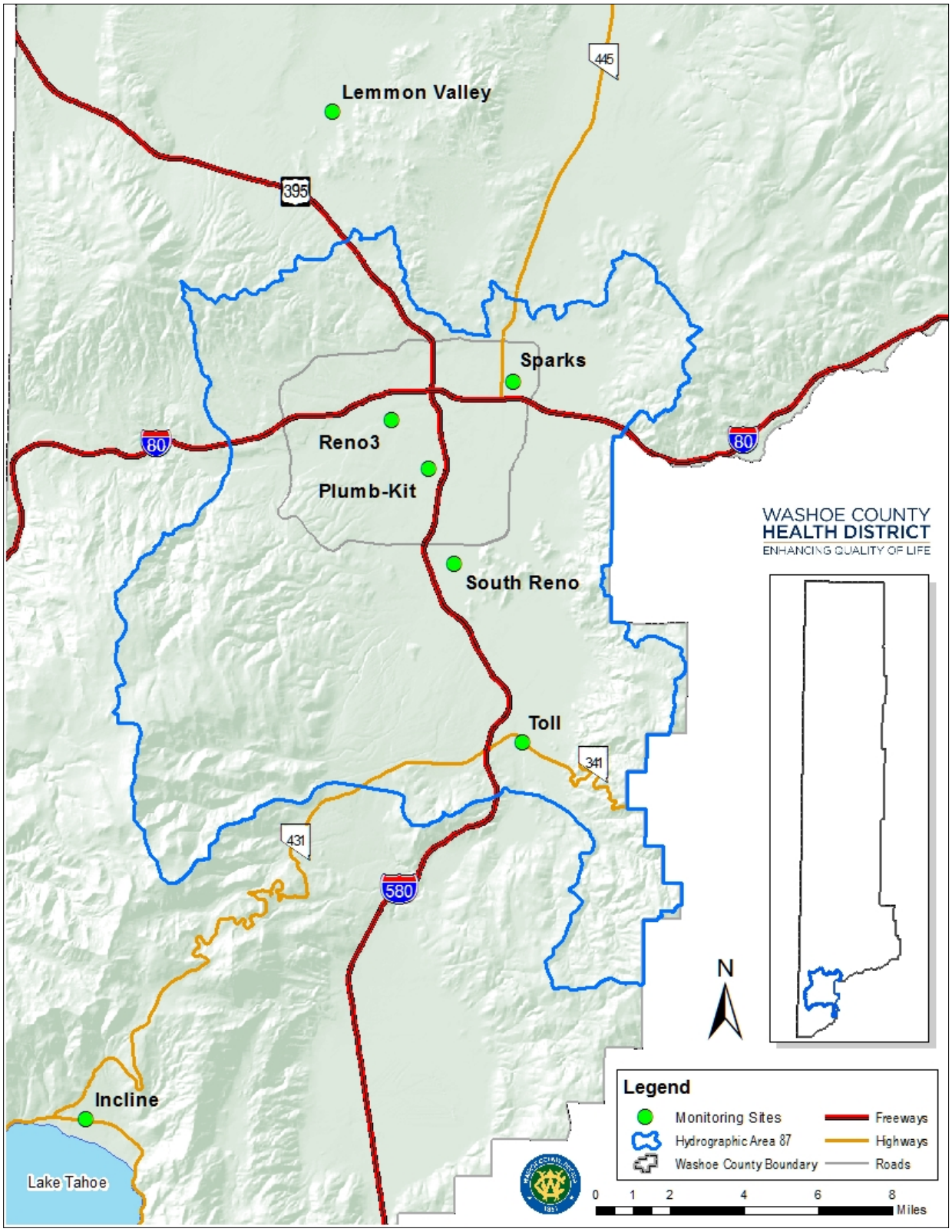
1.2 Overview of Monitoring Network

In 2016, the Washoe County Health District, Air Quality Management Division (AQMD) operated seven ambient air monitoring sites in Washoe County (Figure 1.2). The blue boundary delineates HA87 as defined by the State of Nevada, Division of Water Resources. Table 1.2 lists the parameters monitored in 2016, sorted by site.

Table 1.2: List of Monitoring Sites and Pollutants Monitored in 2016

Site	O_3	CO	Trace CO	Trace NO	NO_2	NO_x	Trace NOy	Trace SO_2	PM_{10}	$PM_{2.5}$	PM_{coarse}	$PM_{2.5}$ Speciation	Meteorology
Incline	✓												
Lemmon Valley	✓	✓											
Plumb-Kit									✓				✓
Reno3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
South Reno	✓								✓				✓
Sparks	✓	✓							✓	✓	✓		✓
Toll	✓	✓							✓				✓

Figure 1.2: Washoe County Health District - AQMD Ambient Air Monitoring Sites

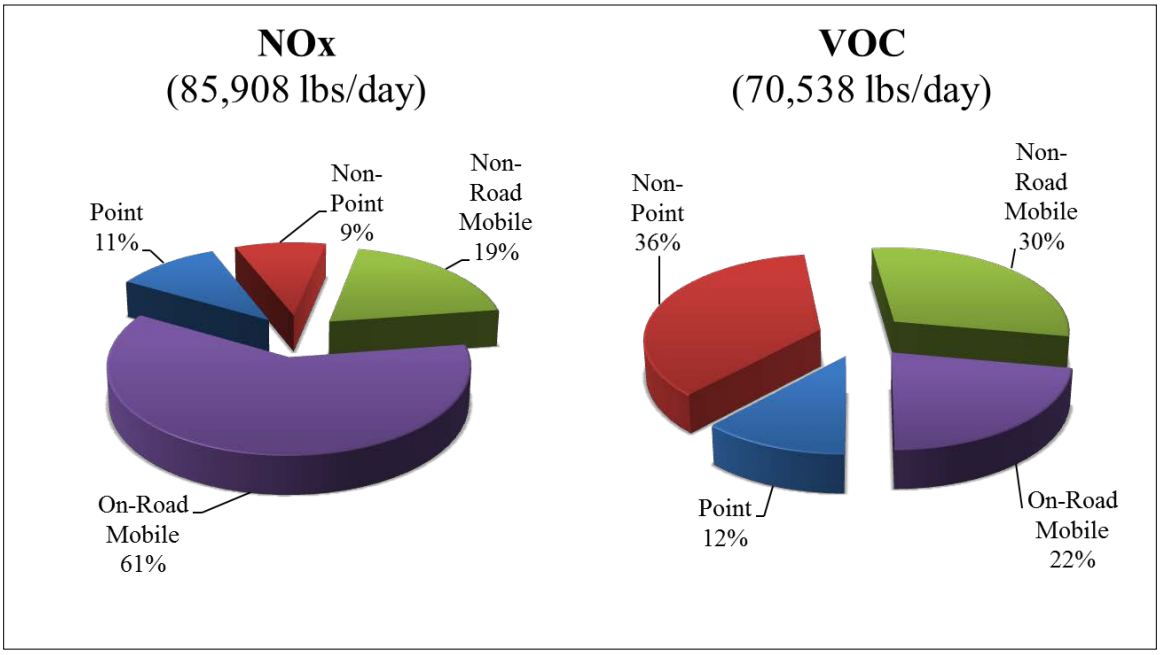


The AQMD's ambient air monitoring network meets the minimum monitoring requirements for all criteria pollutants pursuant to Title 40, Part 58 of the Code of Federal Regulations (CFR), Appendix D. Washoe County's monitoring network is reviewed annually pursuant to 40 CFR 58.10 to ensure the network meets the monitoring objectives defined in 40 CFR 58, Appendix D (See Appendix A). Data was collected and quality assured in accordance with 40 CFR 58 and submitted to the Air Quality System (AQS). Additionally, 2016 data was certified on February 17, 2016 (See Appendix B).

1.3 Characteristics of Non-Event O_3 Formation

Ozone is formed from a chemical reaction between nitrogen oxides and volatile organic compounds in the presence of sunlight. Mobile Sources (On-Road and Non-Road) are the largest categories of O_3 precursor emitters. Figure 1.3 illustrates the O_3 planning inventory, which represents Nitrogen Oxide (NOx) and Volatile Organic Compounds (VOC) emissions for a typical summer day.

Figure 1.3: NOx and VOC Emissions for a Typical Day in Summertime



Based on historic, non-event O_3 monitoring data for the previous six years, below are the characteristics of O_3 levels throughout the year in the Truckee Meadows.

1. January through March: This is generally the period with the lowest O_3 concentrations during the year because of the cooler temperatures, shorter days, and unsettled weather patterns.
2. April through May: This is a transitional period between spring and summer. 8-hour O_3 concentrations above 0.065 parts per million (ppm) are unusual. Infrequently, meteorological conditions (specifically from late April to early June) are favorable for O_3 formation in Northern/Central California followed by stronger than normal west-

southwesterly winds conducive to interstate transport of existing pollution downwind towards the Truckee Meadows.

3. June through August: The highest O_3 levels are typically observed during these summer months. Mobile Source activity, including Vehicle Miles Traveled (VMT), peaks during the summer. Afternoon winds, also known as the Washoe Zephyr, typically keep O_3 concentrations from reaching NAAQS levels. These are the months where wildfire smoke and secondary O_3 impacts are most likely to occur. Historic (2011-2016) 8-hour statistics at the Reno3 monitoring station (AQS ID 32-031-0016), excluding 2015 exceptional events exceedances, are listed below (Table 1.3).

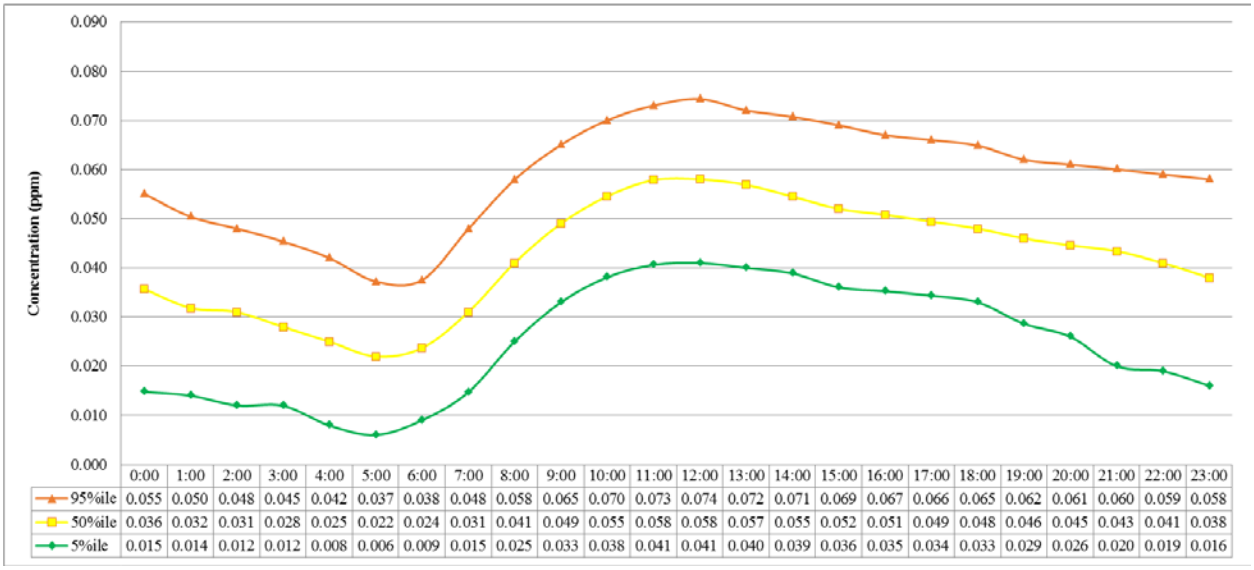
Table 1.3: 8-hour Summertime O_3 Concentrations at Reno3 (2011-2016)

Percentile	Concentration (ppm)
100	0.075
99	0.073
98	0.072
95	0.069
90	0.067
50	0.057

4. September through October: Ozone concentrations typically begin to decrease as mobile source activity, temperatures, and solar radiation also decrease. Wildfire smoke and secondary O_3 impacts can still be observed during this period.
5. November through December: Ozone concentrations are typically low during these months because of cooler temperatures and shorter days.

Figure 1.4 illustrates the typical summertime (June-August) diurnal O_3 pattern at the Reno3 monitoring site. These patterns are based on historic O_3 data from 2011 to 2015 excluding 2015 exceptional events exceedances. Ozone concentrations in the Truckee Meadows typically decrease late afternoon into the early morning hours, reaching a minimum concentration at 5am, then steeply increase reaching a maximum concentration at 12pm.

Figure 1.4: Typical Summertime 1-hour O_3 Diurnal Pattern at Reno3 (2011-2015)



	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016

1.4 Characteristics of Wildfire Event O_3Formation

Wildfires in the Western U.S. can occur any month of the year. The most intense fires occur during the summer months when temperatures are highest and fuel moisture is lowest. The Truckee Meadows can be, and has been, affected by wildfire smoke from fires located anywhere between the Canadian and Mexican borders. Depending on meteorological factors, it may take up to several days for wildfire smoke to reach the Truckee Meadows.

Smoke affecting Northern Nevada has the following characteristics.

- An increase in PM, especially $PM_{2.5}$
- An increase in the $PM_{2.5}/PM_{10}$ ratio during event days, indicating combustion sources rather than geologic
- An increase in elemental and organic carbon
- An increase in the $PM_{2.5}$/CO ratio indicating a different combustion source
- A reduction in visibility

These increases and decreases are in comparison to seasonal, monthly, daily, and hourly historic normals.

Additional characteristics of wildfire smoke impacting the Truckee Meadows include the following.

- Narratives from the National Weather Service - Reno that include the terms "haze" and/or "smoke"
- Narratives from the National Environmental Satellite, Data, and Information Service (NESDIS)[1] that include the terms "haze" and/or "smoke" and "Nevada"
- Hazard Mapping System (HMS) detected fires and smoke layers indicating the presence of smoke upwind of the Truckee Meadows
- Visible satellite images indicating smoke upwind of the Truckee Meadows
- HYSPLIT trajectories indicating an intersection between smoke and a backward trajectory ending in the Truckee Meadows.

Wildfire smoke can also contribute to an increase in ground level O_3. These increases are observed in comparison to seasonal, monthly, daily, and hourly historic normals. The September 2016 "Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations" (Wildfire Ozone Guidance) uses emissions and distance as a screening criterion for the level of documentation needed for an event demonstration. It is important to point out that academic research on the behavior of O_3 production from a wildfire generally concludes that O_3 production may increase with plume age and distance from the wildfire.[2]

[1] National Oceanic and Atmospheric Administration; Office of Satellite and Product Operations.
[2] Jaffe, D.A., and Wigder, N.L., 2012. Ozone production from wildfires: A critical review. Atmospheric Environment 51, 1-10, doi:10.1016/j.atmosenv.2011.11.063.

2.0 EXCEPTIONAL EVENT SUMMARY

2.1 Exceptional Events Definition and Demonstration Criteria

On October 3, 2016, the EPA finalized revisions to the "Treatment of Data Influenced by Exceptional Events", regulations that govern the exclusion of event-influenced air quality data from certain regulatory decisions under the Clean Air Act (CAA) Section 319(b). This rule is known as the Exceptional Events Rule (EER). The EER contains definitions, procedural requirements, requirements for air agency demonstrations, and criteria for EPA approval for the exclusion of air quality data from regulatory decisions. The EER states that the EPA has the authority to exclude air quality monitoring data from regulatory determinations related to exceedances or violations of the NAAQS and avoid designating an area as nonattainment, redesignating an area as nonattainment, or reclassifying an existing nonattainment area to a higher classification if a State adequately demonstrates that an exceptional event has caused an exceedance or violation of a NAAQS. The CAA includes four requirements that, collectively, define an exceptional event:

1. The event affected air quality,
2. The event was not reasonably controllable or preventable,
3. The event was caused by human activity that is unlikely to recur at a particular location or was a natural event,
4. There exists a clear causal relationship between the specific event and the monitored exceedance.

EPA regulations in 40 CFR 50.14(c)(3)(iv) states that exceptional events demonstrations must address and include the following elements:

1. A narrative conceptual model;
2. A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance;
3. Analyses comparing the claimed event influenced concentrations at the monitoring site;
4. A demonstration that the event was both not reasonably controllable and not reasonably preventable;
5. A demonstration that the event was a human activity unlikely to recur at a particular location or was a natural event; and

2.2 Statement of Purpose

From July 2 through July 4, 2016, the AQMD monitored three exceedances of the 2015 8-hour O_3 NAAQS at the Reno3 air quality monitoring site due to wildfire smoke plume impacts from the Trailhead Fire in California. The AQMD has determined that this wildfire influenced O_3 concentrations exceeding the 2015 NAAQS from July 2 through July 4, 2016 and qualify as an exceptional event under Title 40, Part 50 of the Code of Federal Regulations (40 CFR 50), EER. The purpose of this document is to petition the Regional Administrator for EPA Region 9 to exclude air quality monitoring data for O_3 from the normal planning and regulatory requirements

under the CAA in accordance with the EER. This demonstration package will have a regulatory impact on the 2015 8-hour O_3 designation for Washoe County.

The following demonstration package will define the exceptional event and justify data exclusion according to the CAA 319(b) and the revised EER (40 CFR 50.14(c)(3)(iv). The analysis will address these definitions and provide documentation to establish that the Trailhead Fire qualify as an exceptional event. Specifically, that the event affected air quality by demonstrating that: 1) there was a clear causal relationship between the 8-hour O_3 concentrations in Washoe County, 2) the event was a natural event and 3) the event was not reasonably controllable or preventable. An Exceptional Events Initial Notification was sent to EPA Region 9 on November 11, 2016 (see Appendix C).

This exceptional event demonstration underwent 30-day public comment concurrent with EPA Region 9's review beginning April 14, 2017 pursuant to 40 CFR 50.14(c)(3)(v) (see Appendix D). By June 1, 2017, AQMD will forward any written comments received and provide documentation that the public comment process was followed.

2.3 Summary of Event

The Trailhead Fire, located west of Volcanoville, CA, started June 28, 2016 and burned 5,646 acres. On June 29, 2016, smoke from the Trailhead Fire began to impact the Truckee Meadows. Wildfire smoke continued to affect the Truckee Meadows through July 4, 2016. On July 2 through July 4, 2016, the AQMD monitored 3 exceedances of the 2015 8-hour O_3 NAAQS at the Reno3 air quality monitoring site (AQS 32-031-0016) due to the smoke plume impacts. The Trailhead Fire was 98% contained on July 11, 2016, with this being the final report through InciWeb and only 49 acres burned after July 5, 2016. The AQMD is requesting exclusion of the 8-hour O_3 concentrations from Reno3 from July 2 through July 4, 2016 due to the Trailhead Fire causing exceedances of the O_3 NAAQS.

Daily Event Summaries

The following sections and figures show evidence that there was an exceptional event on July 2, 3, and 4, 2016, and the impacts from the event affected the Truckee Meadows. Included below by event day is: 1) Worldview satellite image of visible smoke from the Trailhead fire; 2) AirNow Tech images of the active fires, HMS smoke plume, and O_3 concentrations; and 3) HMS smoke plume maps for June 29 through July 4, 2016. Trailhead Fire perimeter maps are included in the daily event summaries when available (June 29, July 2, 4, and 5, 2016).

Event Summary
Wednesday, June 29, 2016

Figure 2.1: Satellite Image of the Trailhead Fire June 29, 2016

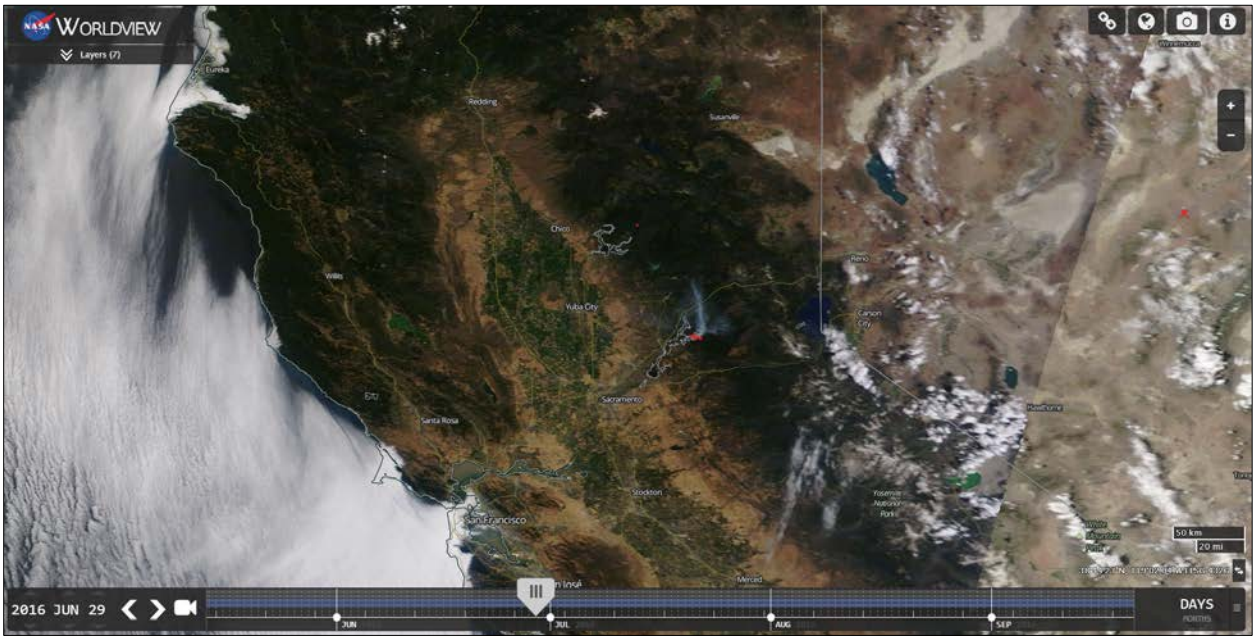


Figure 2.2: AirNow Tech Image of Active Fires, Smoke Plumes, and O_3 for June 29, 2016

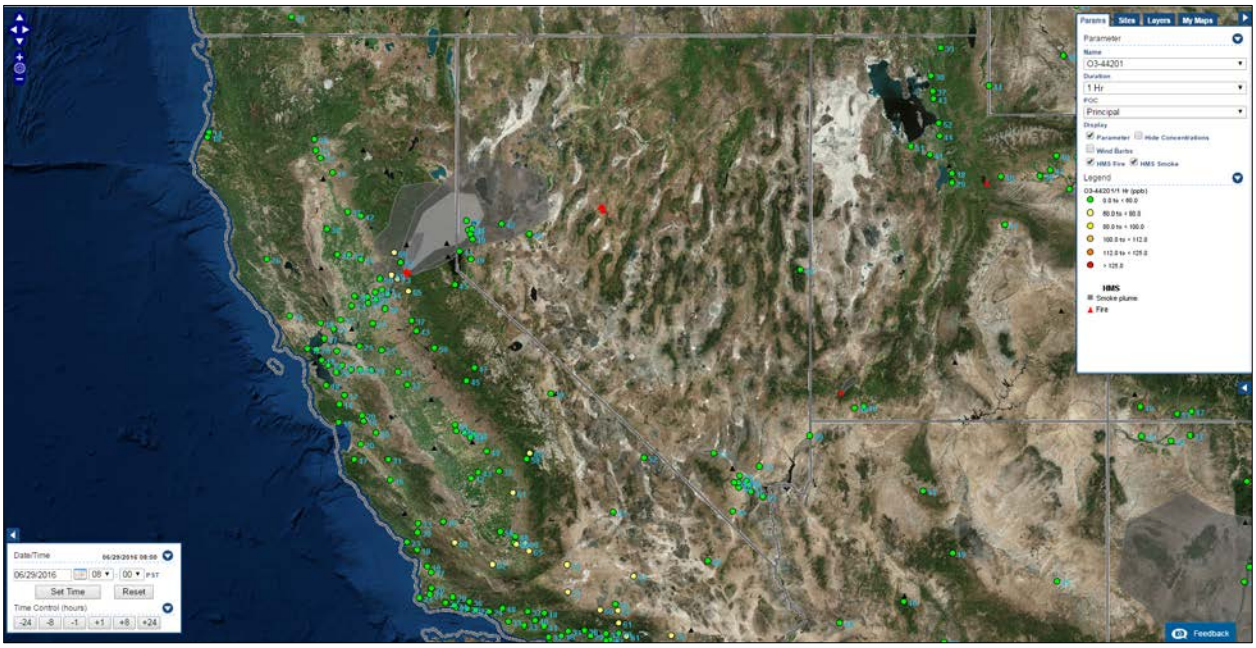


Figure 2.3: Trailhead Fire Perimeter Map June 29, 2016

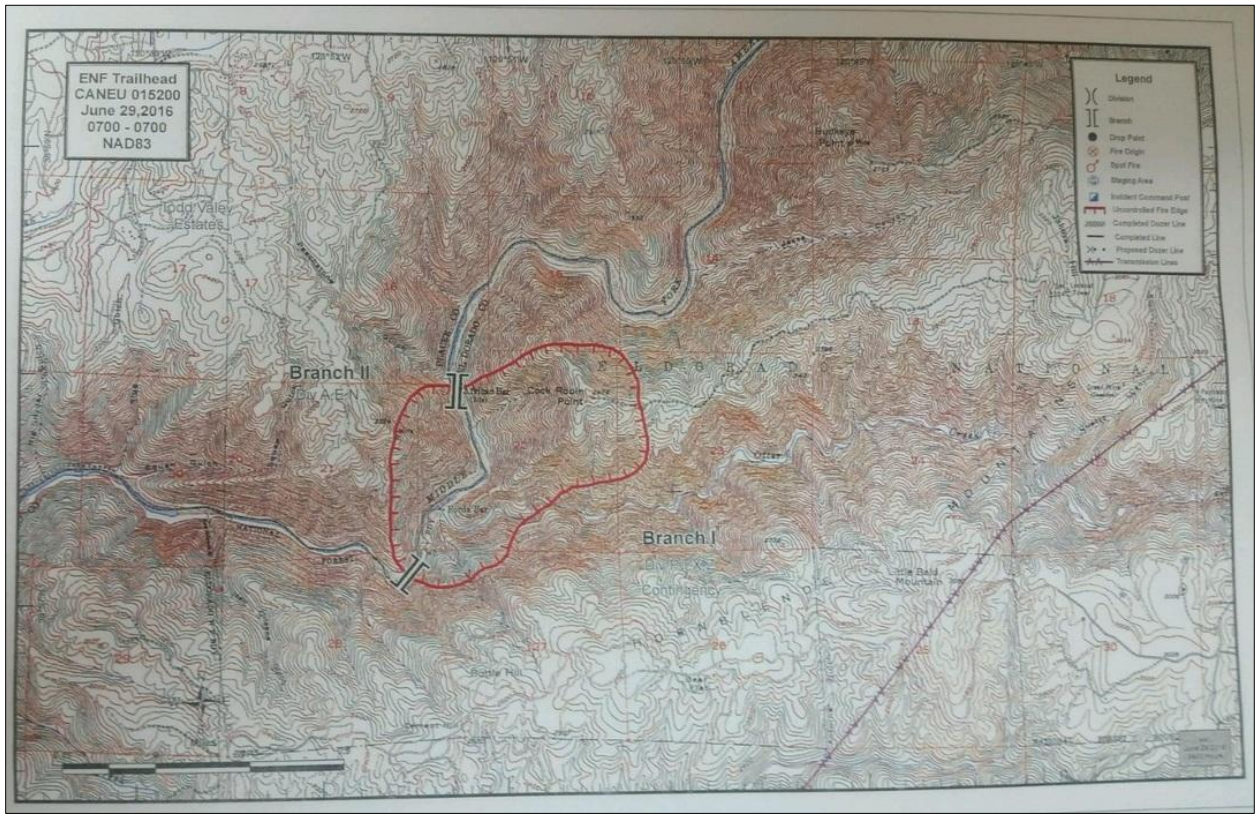
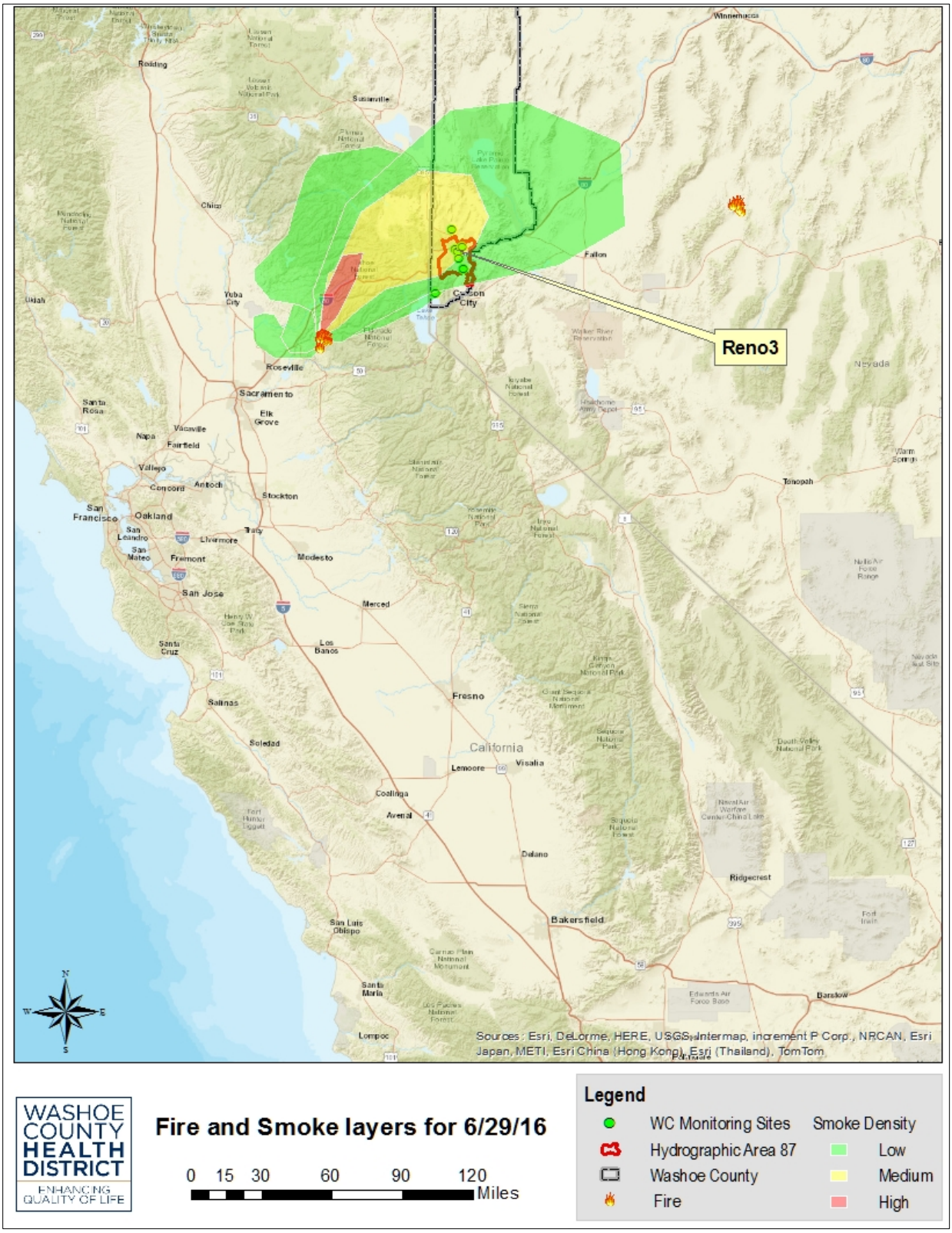


Figure 2.4: HMS Smoke Plume Map June 29, 2016



Event Summary
Thursday, June 30, 2016

Figure 2.5: Satellite Image of the Trailhead Fire June 30, 2016

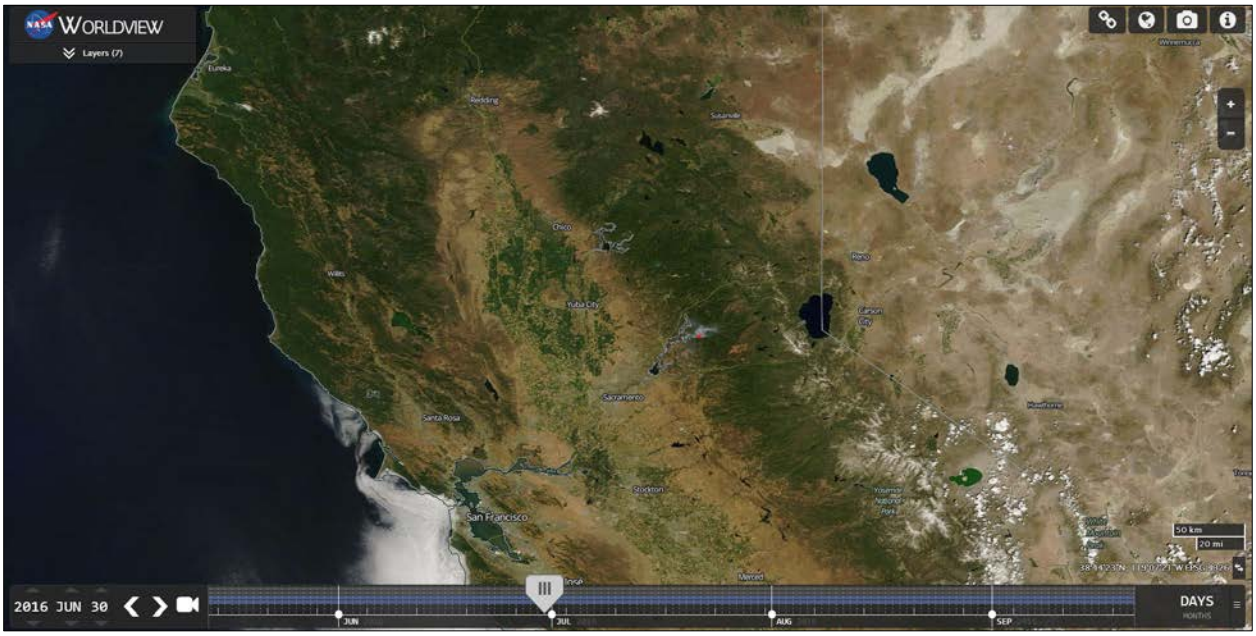


Figure 2.6: AirNow Tech Image of Active Fires, Smoke Plumes, and O_3 for June 30, 2016

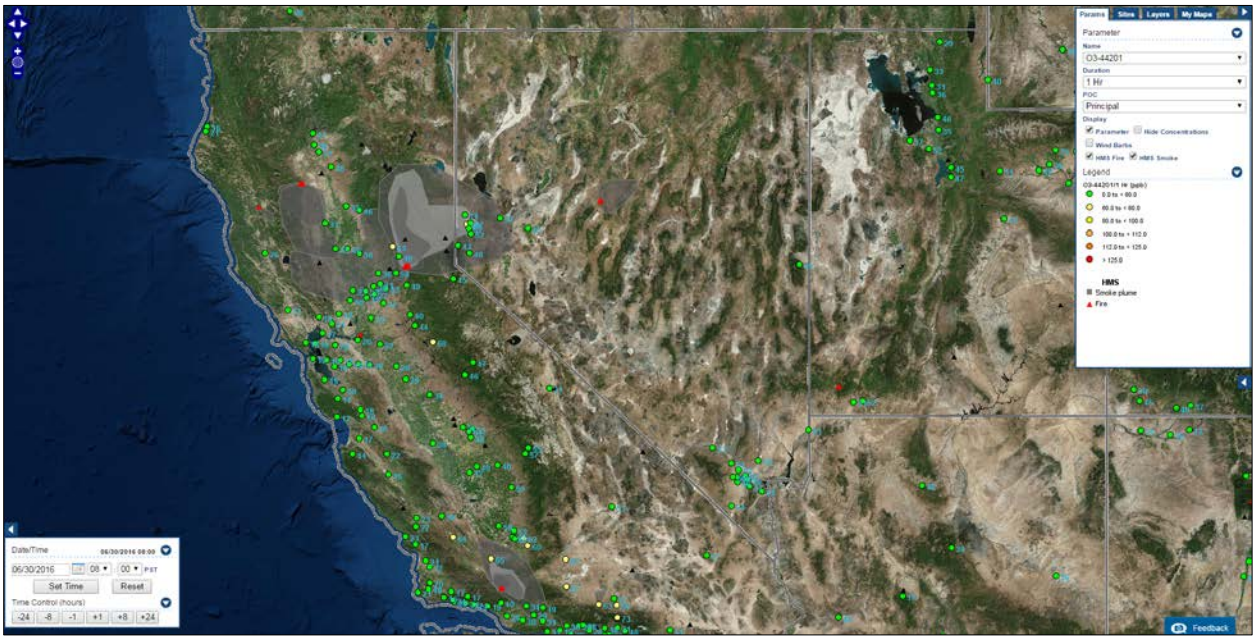
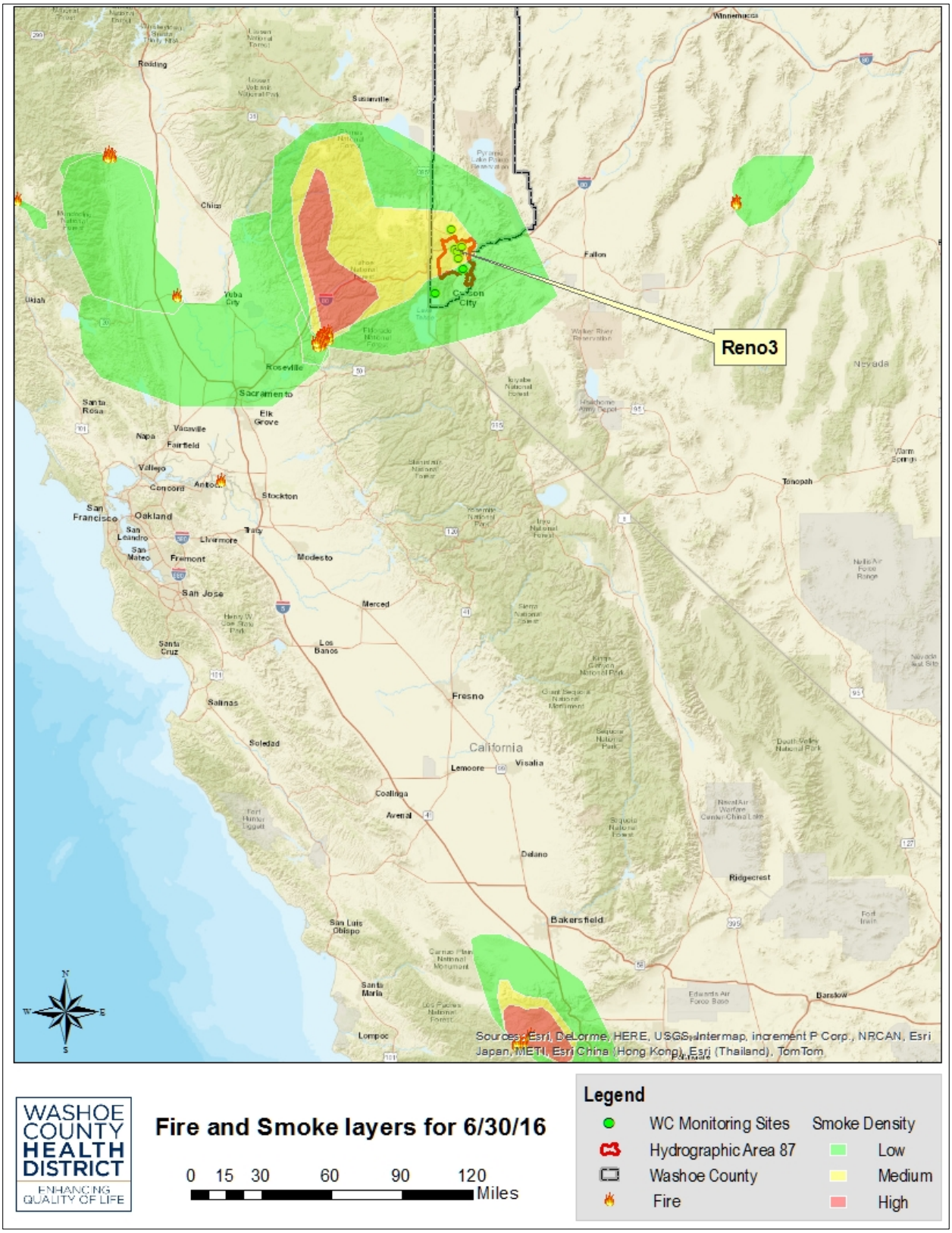


Figure 2.7: HMS Smoke Plume Map June 30, 2016



Event Summary
Friday, July 1, 2016

Figure 2.8: Satellite Image of the Trailhead Fire July 1, 2016

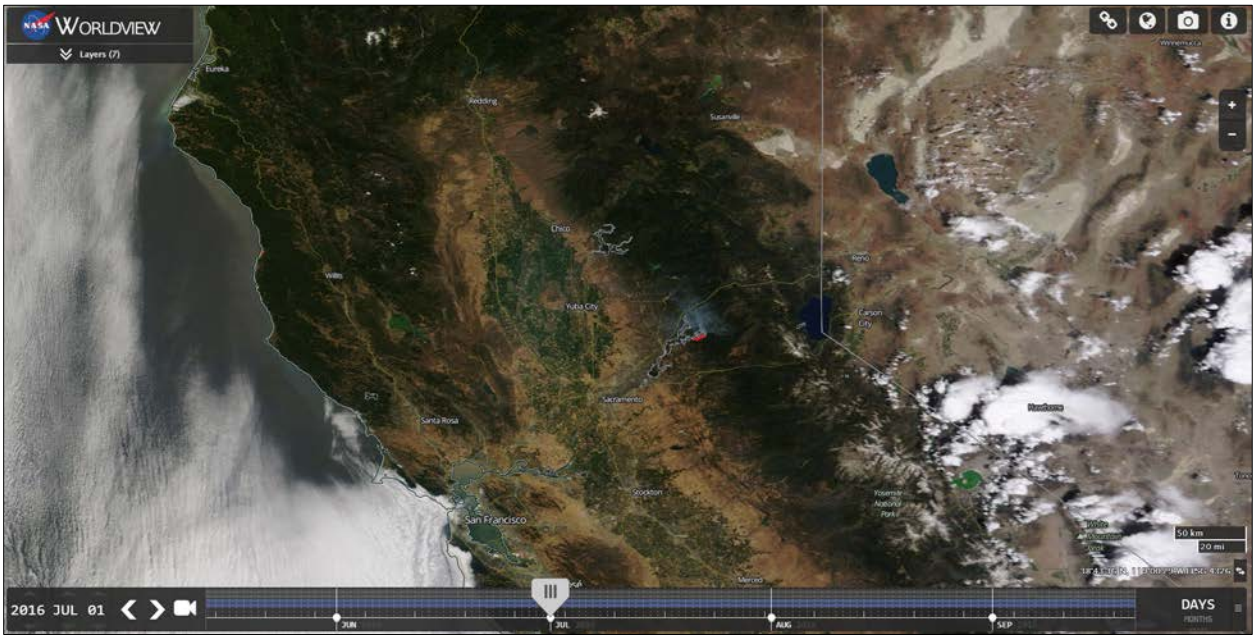


Figure 2.9: AirNow Tech Image of Active Fires, Smoke Plumes, and O_3 for July 1, 2016

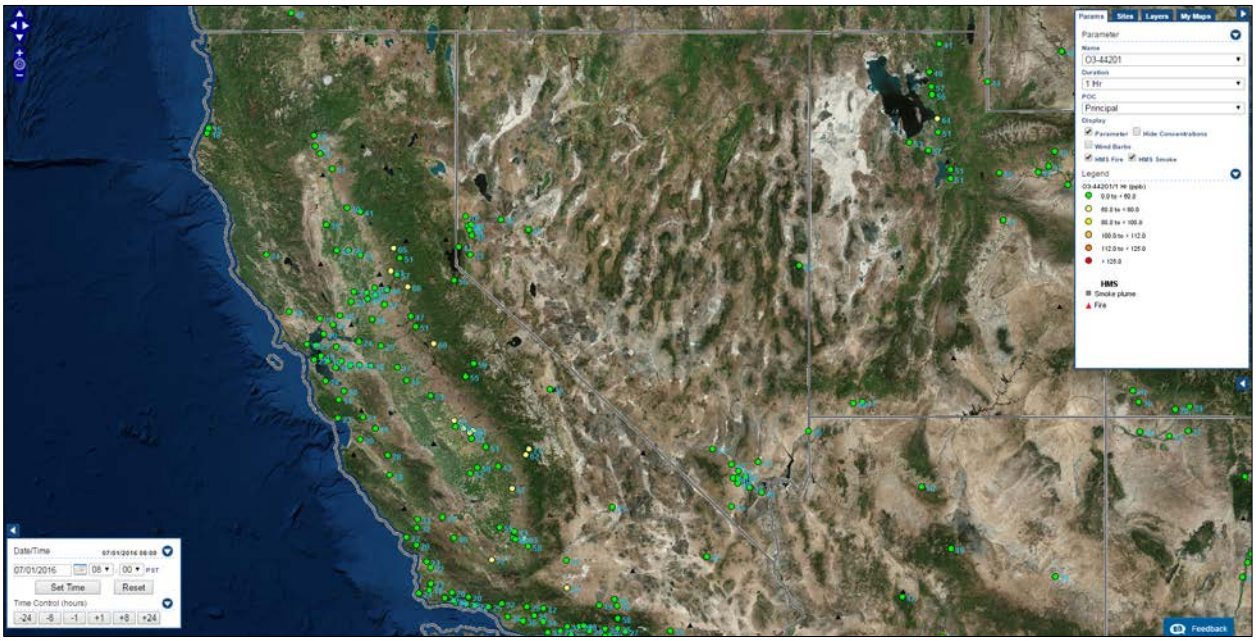
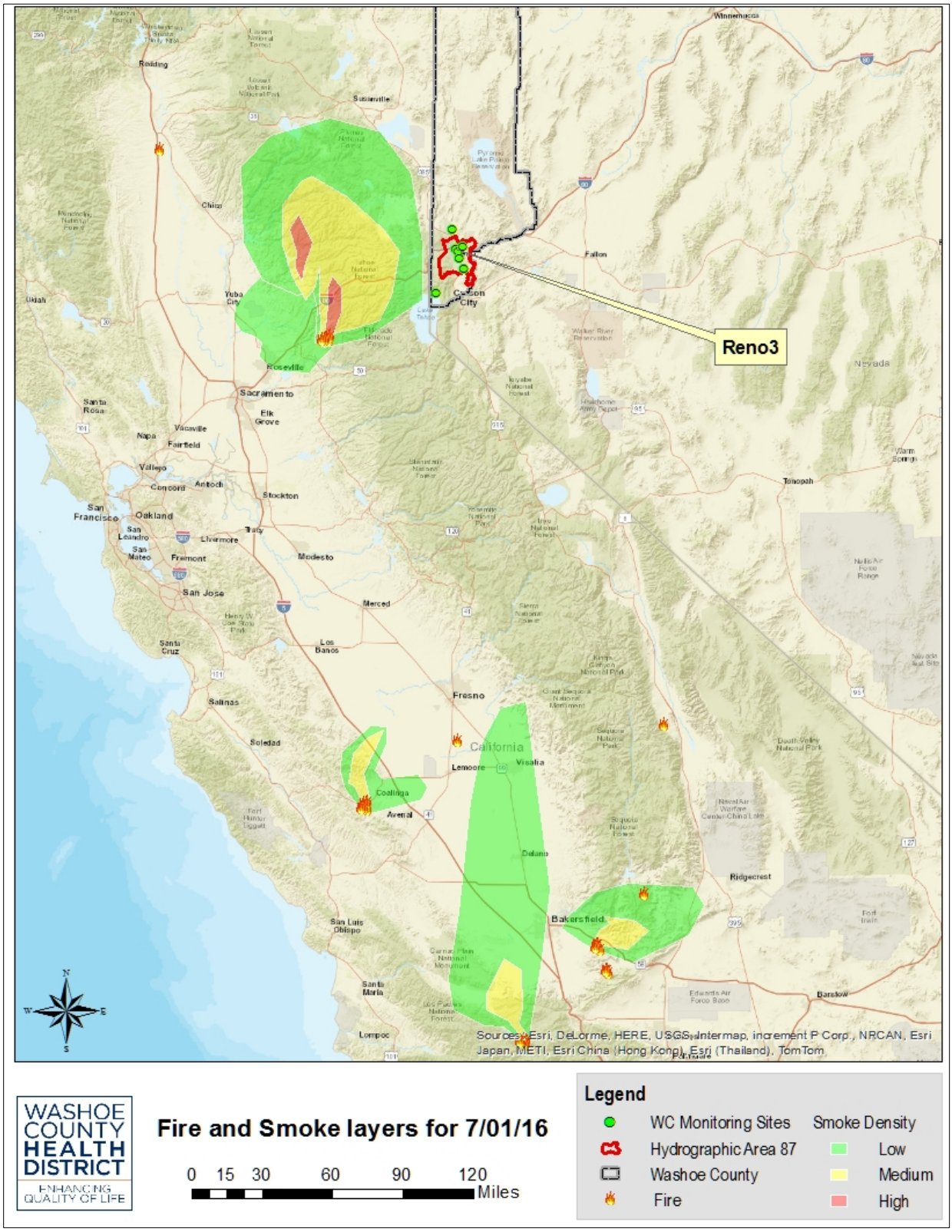


Figure 2.10: HMS Smoke Plume Map July 1, 2016



Event Summary
Saturday, July 2, 2016

Figure 2.11: Satellite Image of the Trailhead Fire July 2, 2016

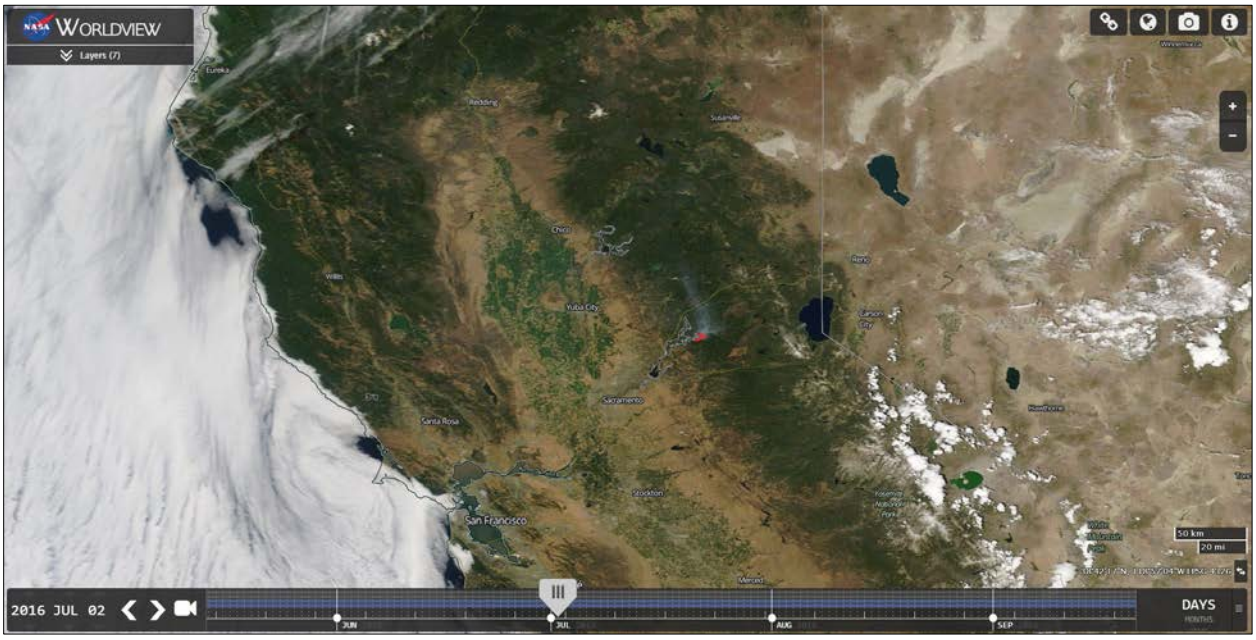


Figure 2.12: AirNow Tech Image of Active Fires, Smoke Plumes, and O_3 for July 2, 2016

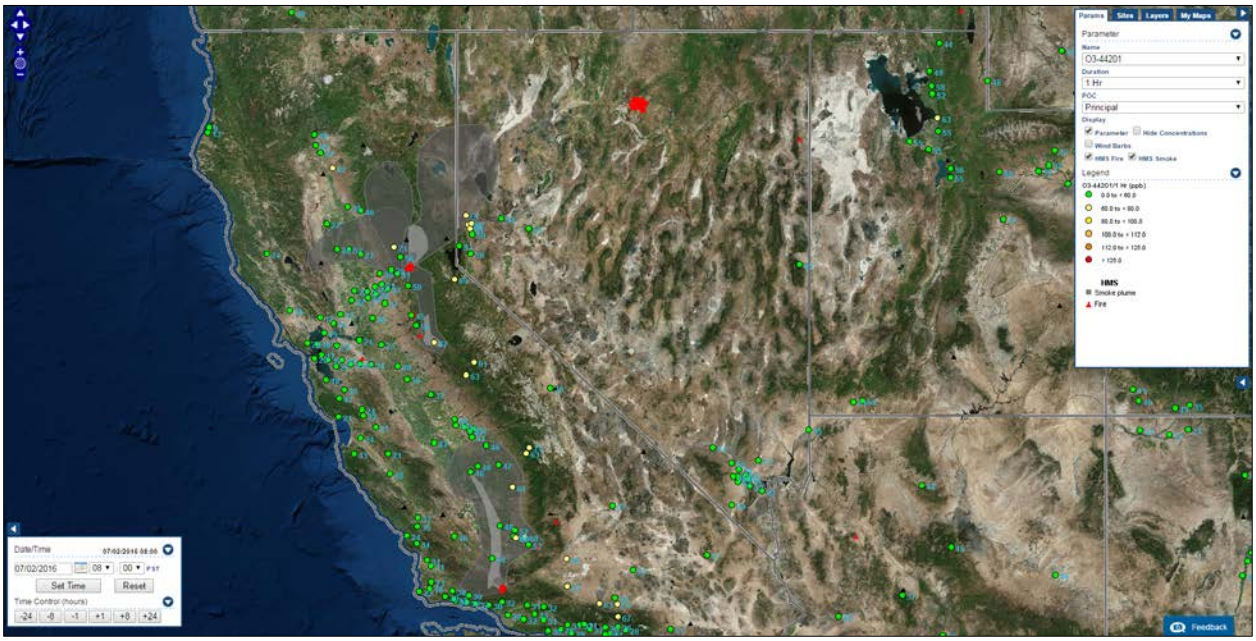


Figure 2.13: Trailhead Fire Perimeter Map July 2, 2016

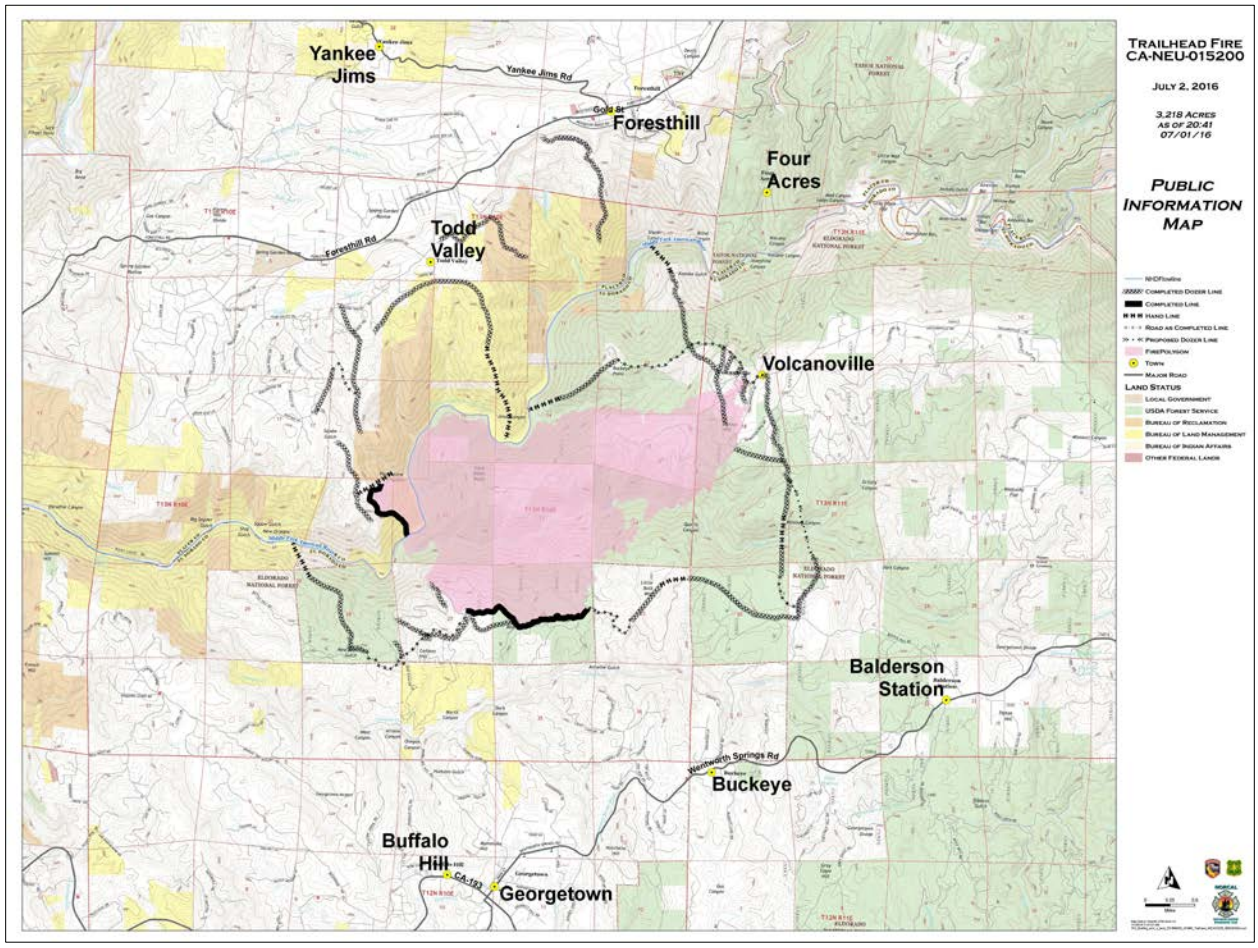
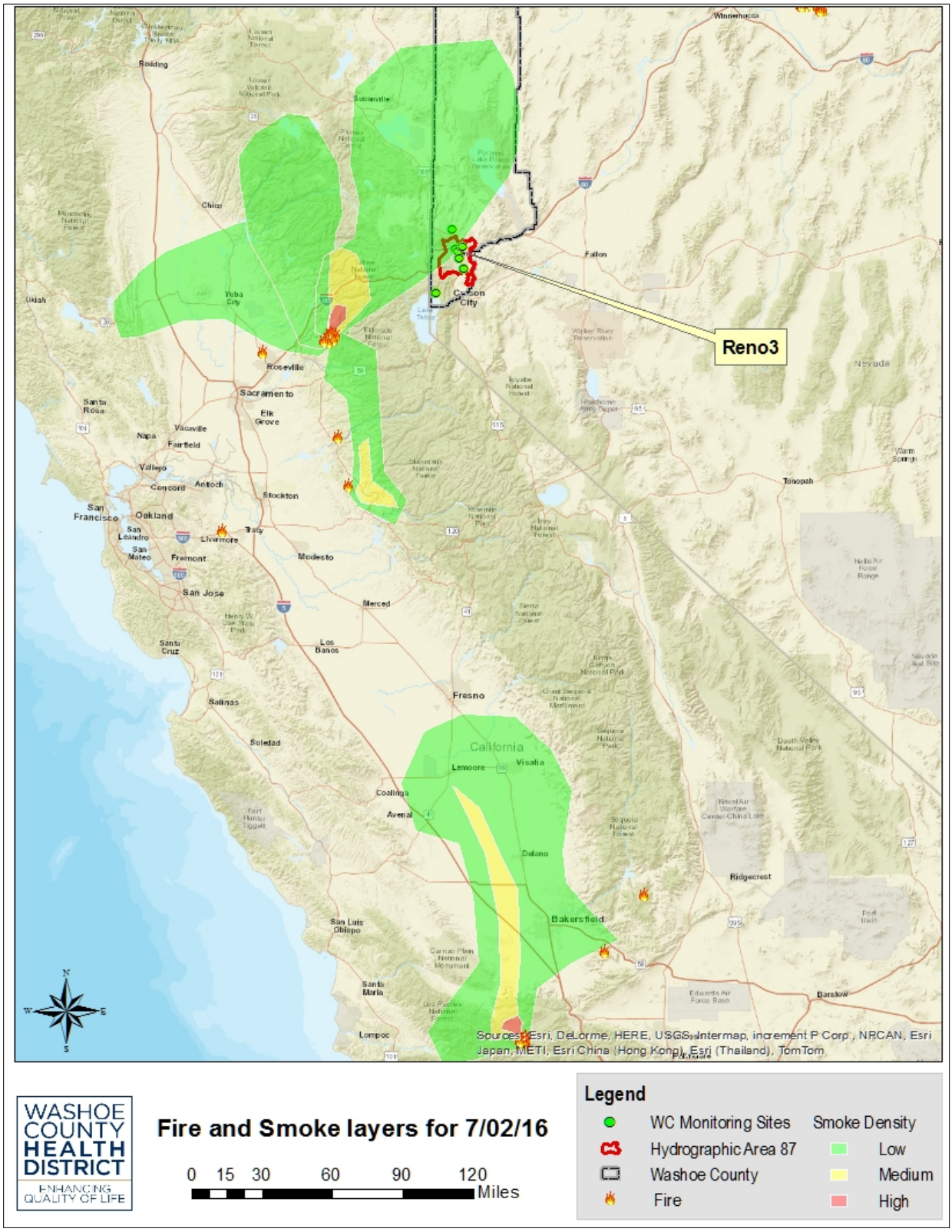


Figure 2.14: HMS Smoke Plume Map July 2, 2016



Event Summary
Sunday, July 3, 2016

Figure 2.15: Satellite Image of the Trailhead Fire July 3, 2016

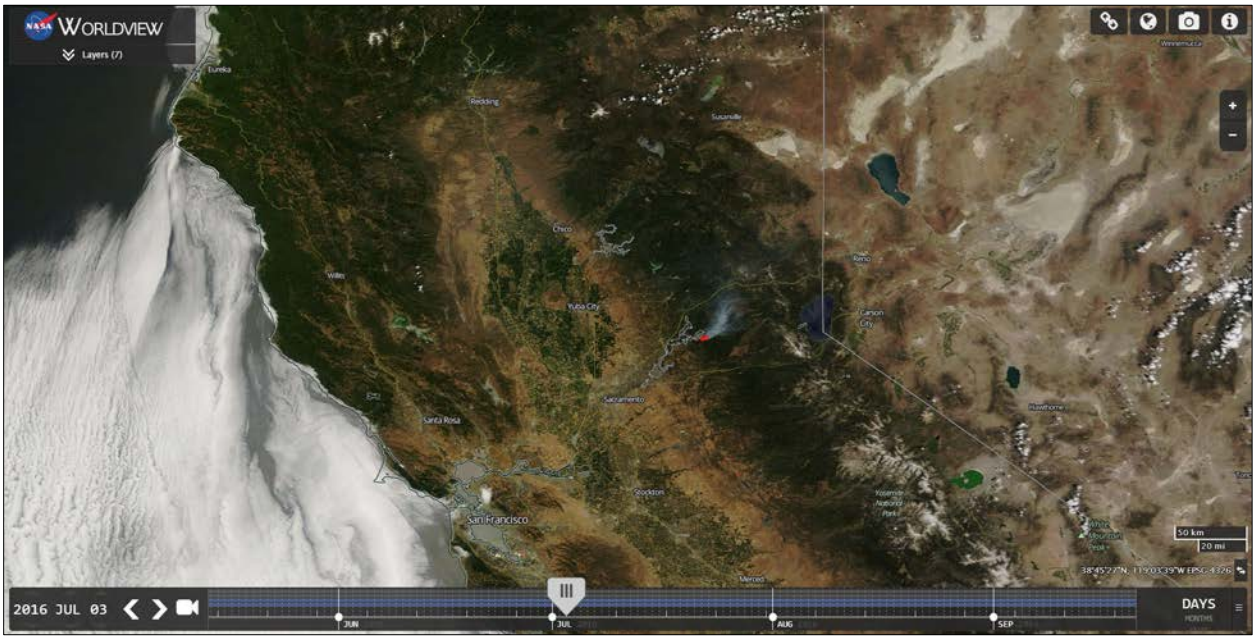
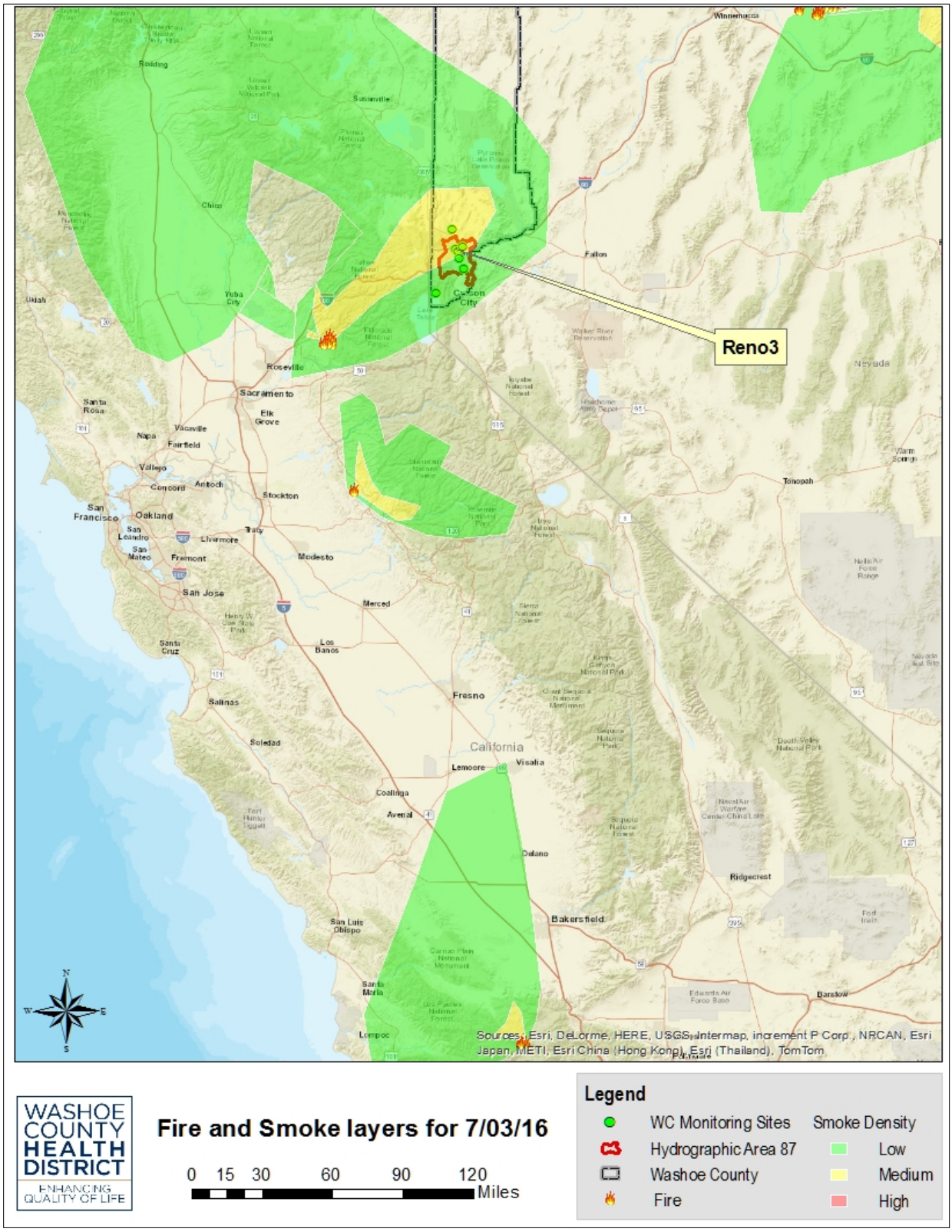


Figure 2.16: AirNow Tech Image of Active Fires, Smoke Plumes, and O_3 for July 3, 2016

Figure 2.17: HMS Smoke Plume Map July 3, 2016



Event Summary
Monday, July 4, 2016

Figure 2.18: Satellite Image of the Trailhead Fire July 4, 2016

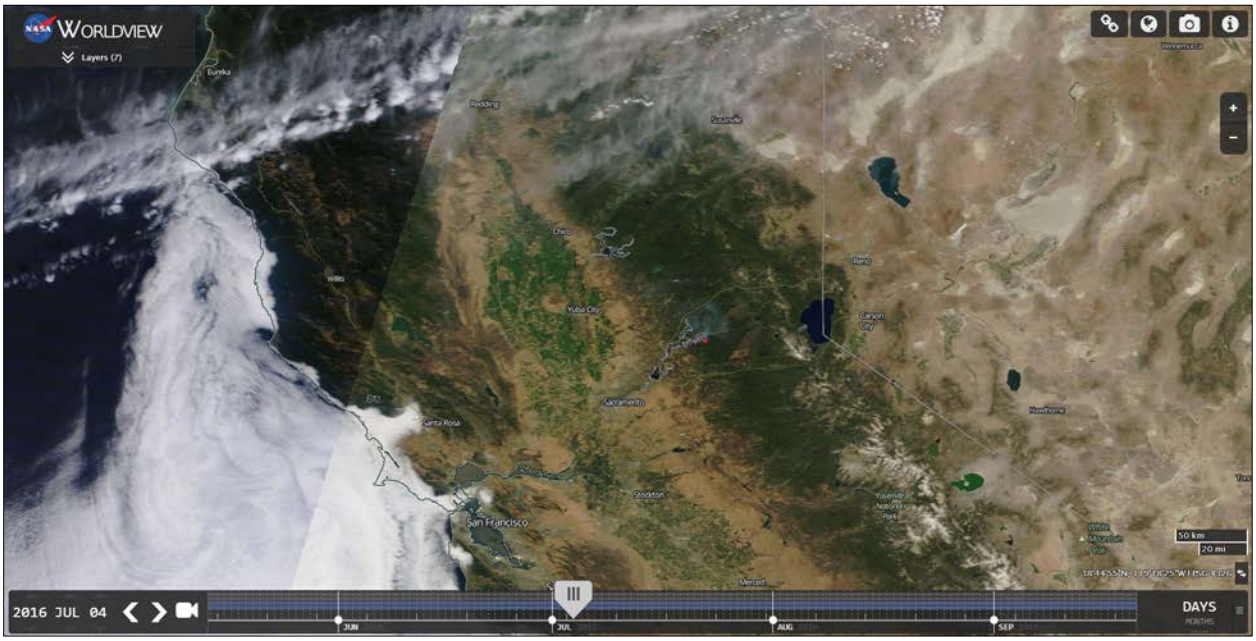


Figure 2.19: AirNow Tech Image of Active Fires, Smoke Plumes, and O_3 for July 4, 2016

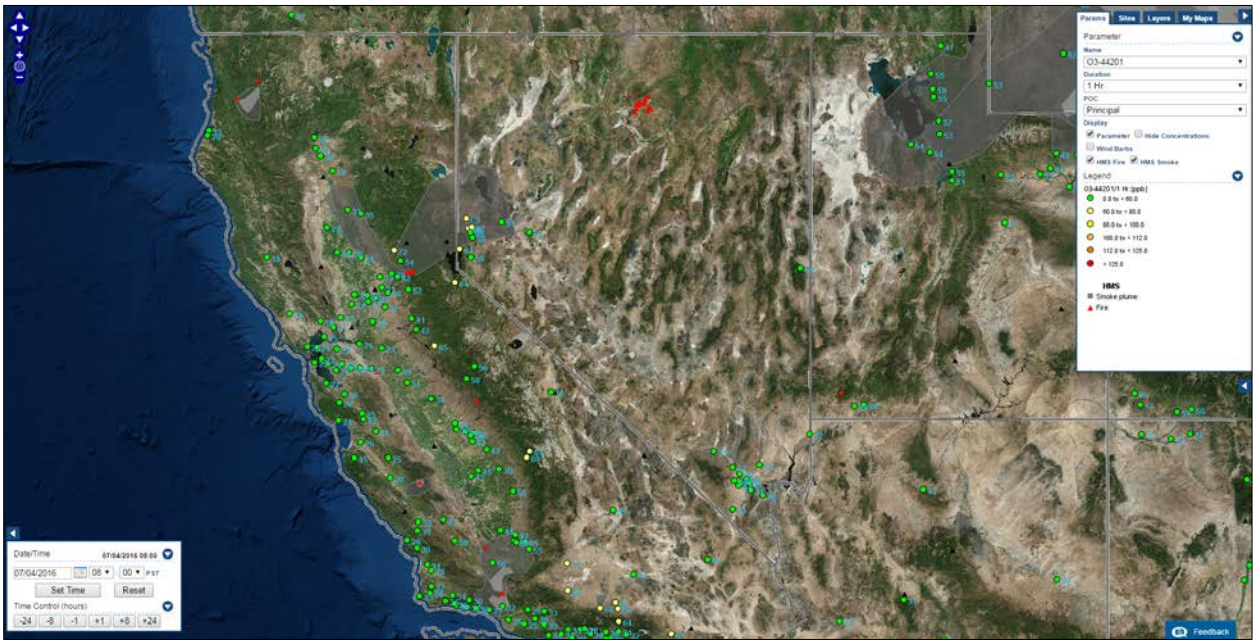


Figure 2.20: Trailhead Fire Perimeter Map July 4, 2016

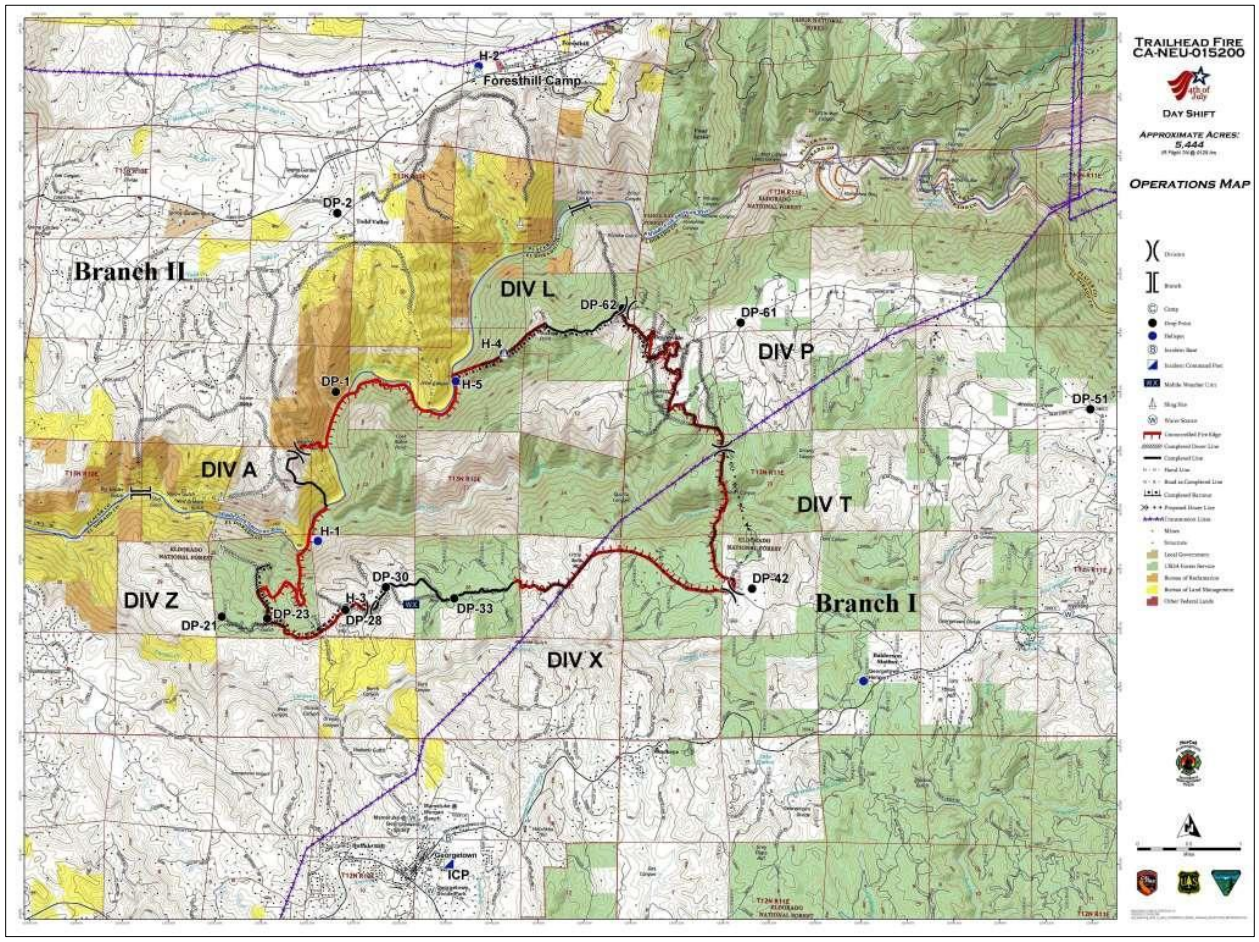
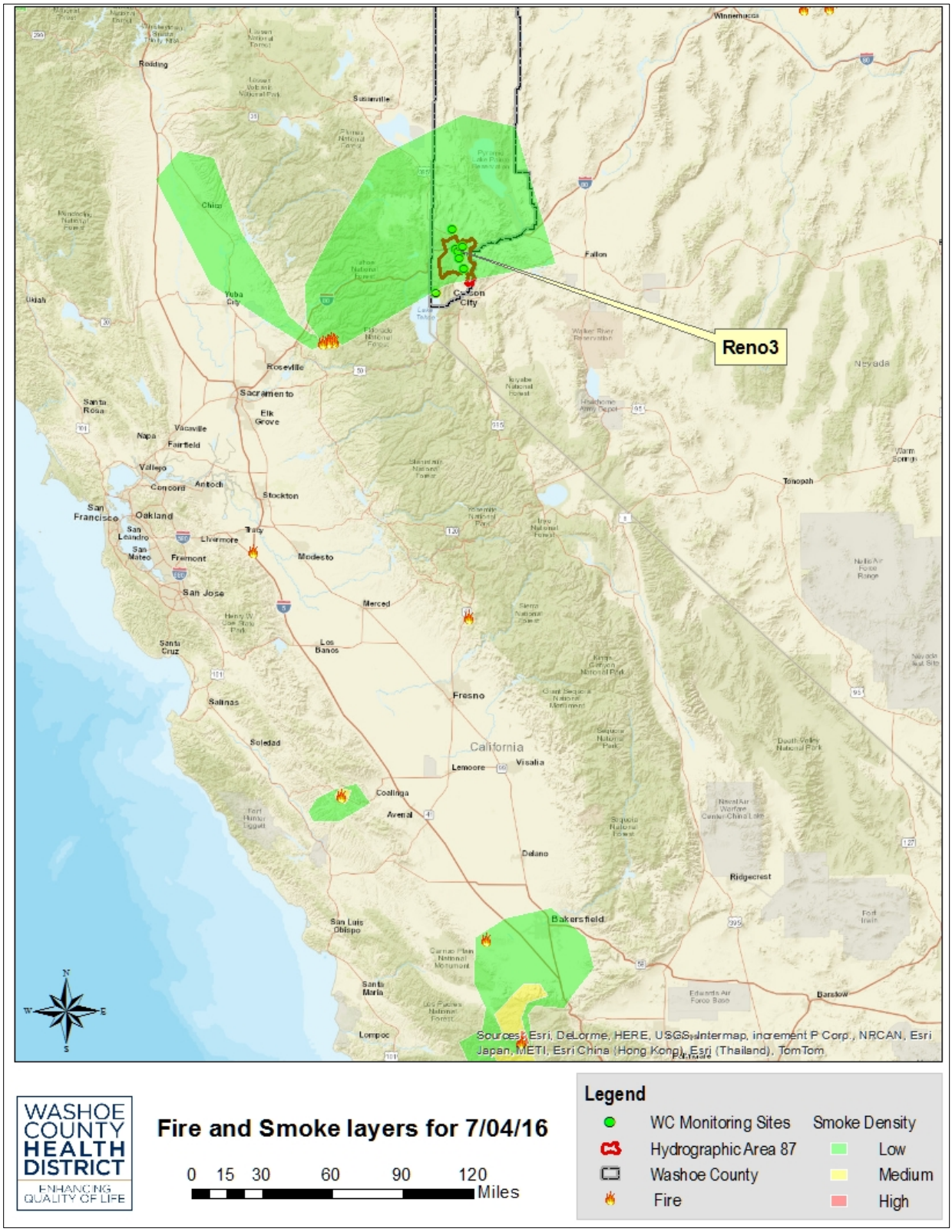


Figure 2.21: HMS Smoke Plume Map July 4, 2016



2.4 Event Related Concentrations

From July 2 through July 4, 2016, the AQMD monitored 3 exceedances of the 2015 8-hour O_3 NAAQS, with concentrations reaching 0.073 ppm each day. Wildfire smoke and O_3 precursors from the Trailhead Fire were transported east into Nevada on prevailing winds. Ozone concentrations were elevated across Nevada, resulting in the O_3 exceedances at the Reno3 monitoring site. Elevated $PM_{2.5}$ and NOx concentrations support the presence of wildfire smoke. Section 2.5 further describes the meteorological conditions experienced during the event.

Table 2.1 lists O_3 concentrations across the ambient air monitoring network seven days before and after the event. It highlights the elevated concentrations and exceedances at the Reno3 site during the event.

Figure 2.22 shows the $PM_{2.5}$, NOx, and O_3 concentrations at the Reno3 site seven days before and after the July 2 through 4, 2016 wildfire event. These pollutants were affected especially on July 2, 3, and 4, 2016. This supports the demonstration that the increase in wildfire smoke also increased NOx concentrations, which increased O_3 levels. Figure 2.23 shows O_3 and $PM_{2.5}$ concentrations at all other monitoring sites. The elevated concentrations throughout the monitoring network demonstrate that the wildfire smoke impacts were regional and consistent with dispersion from fires 100 kilometers (km) away.

Table 2.1: 8-hour O_3 Concentrations (ppm) for June 25-July 11, 2016

								Exceptional Event	Exceptional Event	Exceptional Event							
	Non-Event			Trailhead Fire Episode							Non-Event						
Monitoring Site	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11
Reno3	0.058	0.062	0.059	0.057	0.067	0.063	0.067	0.073	0.073	0.073	0.068	0.052	0.055	0.047	0.041	0.050	0.052
Sparks	0.055	0.059	0.054	0.052	0.059	0.060	0.061	0.066	0.069	0.068	0.062	0.060	0.052	0.045	0.033	0.046	0.047
Toll	0.052	0.056	0.053	0.054	0.057	0.055	0.059	0.063	0.065	0.063	0.060	0.059	0.051	0.046	0.046	0.051	0.046
South Reno	0.054	0.058	0.054	0.055	0.059	0.057	0.058	0.065	0.066	0.065	0.063	0.056	0.052	0.047	0.044	0.049	0.047
Lemmon Valley	0.055	0.056	0.050	0.051	0.064	0.058	0.065	0.069	0.067	0.070	0.062	0.060	0.054	0.047	0.037	0.048	0.047
Incline	0.053	0.054	0.046	0.047	0.048	0.051	0.055	0.059	0.061	0.060	0.056	0.057	0.045	0.046	0.040	0.046	0.044

In this exceptional event demonstration, AQMD is requesting to exclude all hourly O_3 data from the Reno3 monitoring site for July 2 0000 Pacific Standard Time (PST) through July 4, 2016 2300 PST from comparison to the NAAQS. Exclusion of the data caused by this exceptional event will have a regulatory impact on the attainment designation of the 2015 8-hour O_3 NAAQS.

Figure 2.22: Reno3 O_3, NOx, and $PM_{2.5}$ Hourly Concentrations for June 25 through July 11, 2016

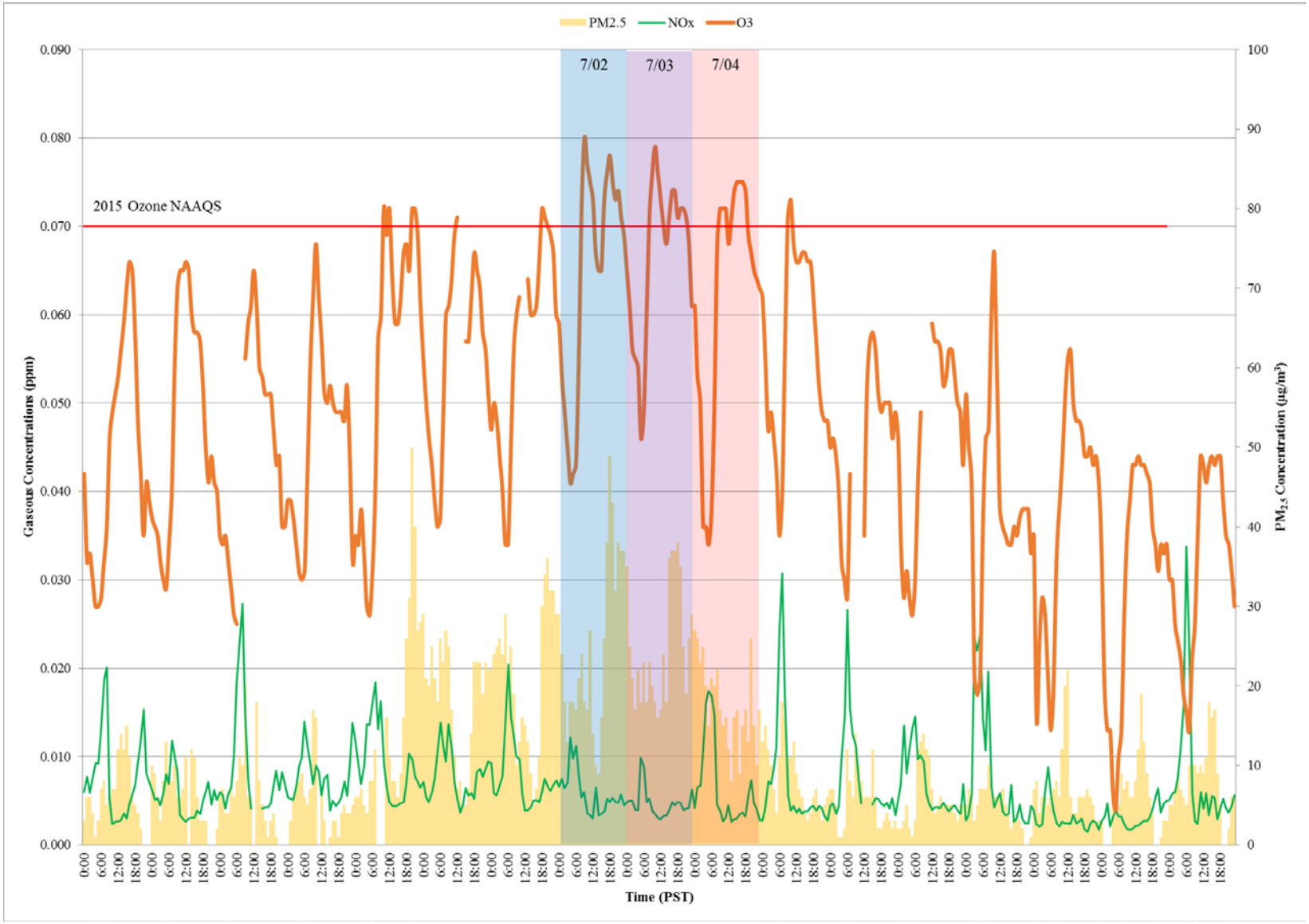
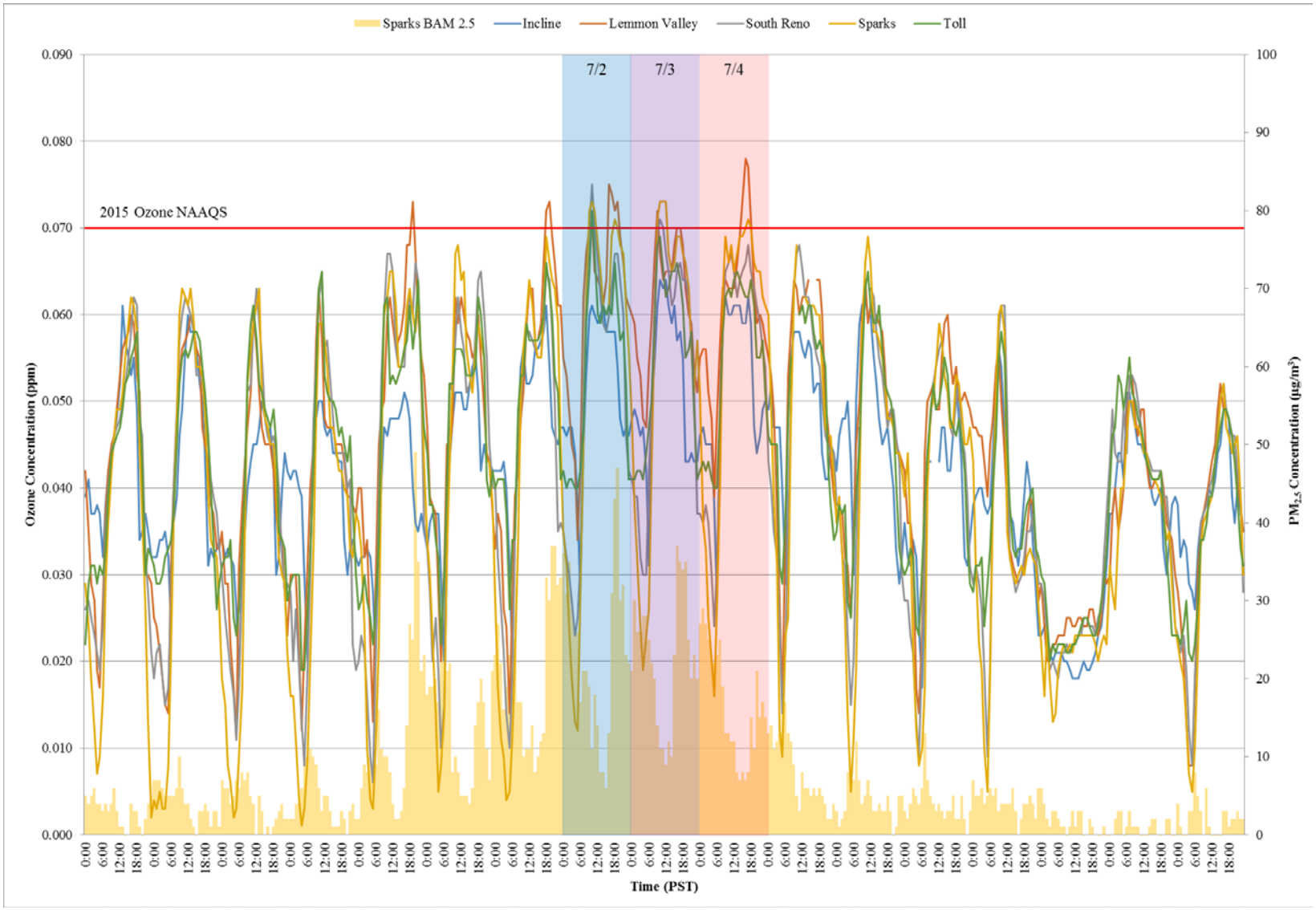


Figure 2.23: Sparks, Incline, Lemmon Valley, South Reno, and Toll O_3 and $PM_{2.5}$ Hourly Concentrations for June 25 to July 11, 2016



2.5 Meteorological Conditions

An Assessment of Meteorological Conditions

June and July is typically a transitional period from weakening, minor upper level troughs and associated westerly winds to one which tends to dominate the primary summer period dominated by a large-scale high pressure system over the western states, more persistent southerly flows, and eventually transport of moisture from Mexico into the southwestern United States, often referred to as the "monsoon season". This pattern leads to the development of thunderstorms, heavy rain, hail, and gusty outflow winds.

In late June 2016, a weak summertime monsoon pattern had set up, with upper level high pressure centered near the four corners area (See Figure 2.24 for June 29). Moisture from Mexico spread northward through Arizona into scattered parts of Nevada. Surface thermal low pressure was located through the northern San Joaquin Valley in California. By June 30 (Figure 2.25), the upper level high moved slightly southeast over New Mexico while weak upper level westerly winds moved across central California. The surface low remained in the northern Sacramento Valley, but weakened. On July 1 (Figure 2.26), the upper level high moved into Texas, allowing the monsoonal moisture to move eastward mostly in the 4-corner states. Some precipitation occurred still in eastern Nevada, but western Nevada was dry. At the surface, low pressure began to develop in Nevada increasing the potential for lower level westerly component winds in addition to the west-northwesterly upper level winds. These conditions increased the potential for transport of smoke from the Trailhead Fire toward the Reno area.

For July 2 (Figure 2.27) and July 3 (Figure 2.28), conditions at the surface and aloft remained similar to that of July 1, so there was persistence in the potential for transport of smoke into the Reno area. On July 4 (Figure 2.29), upper level conditions showed a trough of low pressure moving into the Pacific Northwest with stronger west-northwesterly winds across northern and central California. At the surface, low pressure in southern Nevada expanded northward. The combination of these conditions increased the west-to-east transport potential, but also the effects of the upper level trough began an influence of cooler air, increased mixing potential and low level dispersion.

By July 5 (Figure 2.30), the upper level trough was more pronounced and surface pressure gradients tended to become more northwesterly across Nevada. Under these conditions, any further smoke impacts would be more readily mixed in the atmosphere promoting much less influence on ground-level conditions.

Visibility Analysis

In the desert portions of Northern Nevada, visibilities are typically very good. Strong low level inversions in the winter months by pooling of cold air at the surface can lead to accumulation of locally generated pollution being trapped under the inversion, causing decreases in visibility. This phenomenon only occurs during the cold months of the year. Accordingly, reductions in summertime visibility to levels below 10 miles only occur in the summer under three conditions:

1) Heavy rain from thunderstorms; 2) blowing dust from thunderstorm downdrafts that can cause winds to exceed 50 mph at times; and 3) smoke from wildfires.

Since there were no thunderstorms during the July 2, 3, and 4 period, neither windblown dust nor rain could be the cause of reduced visibilities in Reno. Visibility observations at the Reno-Tahoe International Airport were reduced on the afternoons of July 2 and 3 indicating transport of smoke into the Reno area of sufficient density as to reduce visibilities below 10 miles (Appendix E).

Also, the trending decrease in maximum temperatures during the exceptional event indicate cooler air moving into the area as the upper level winds became more pronounced from a westerly direction, as discussed previously.

Figure 2.24: Daily Weather Map June 29, 2016

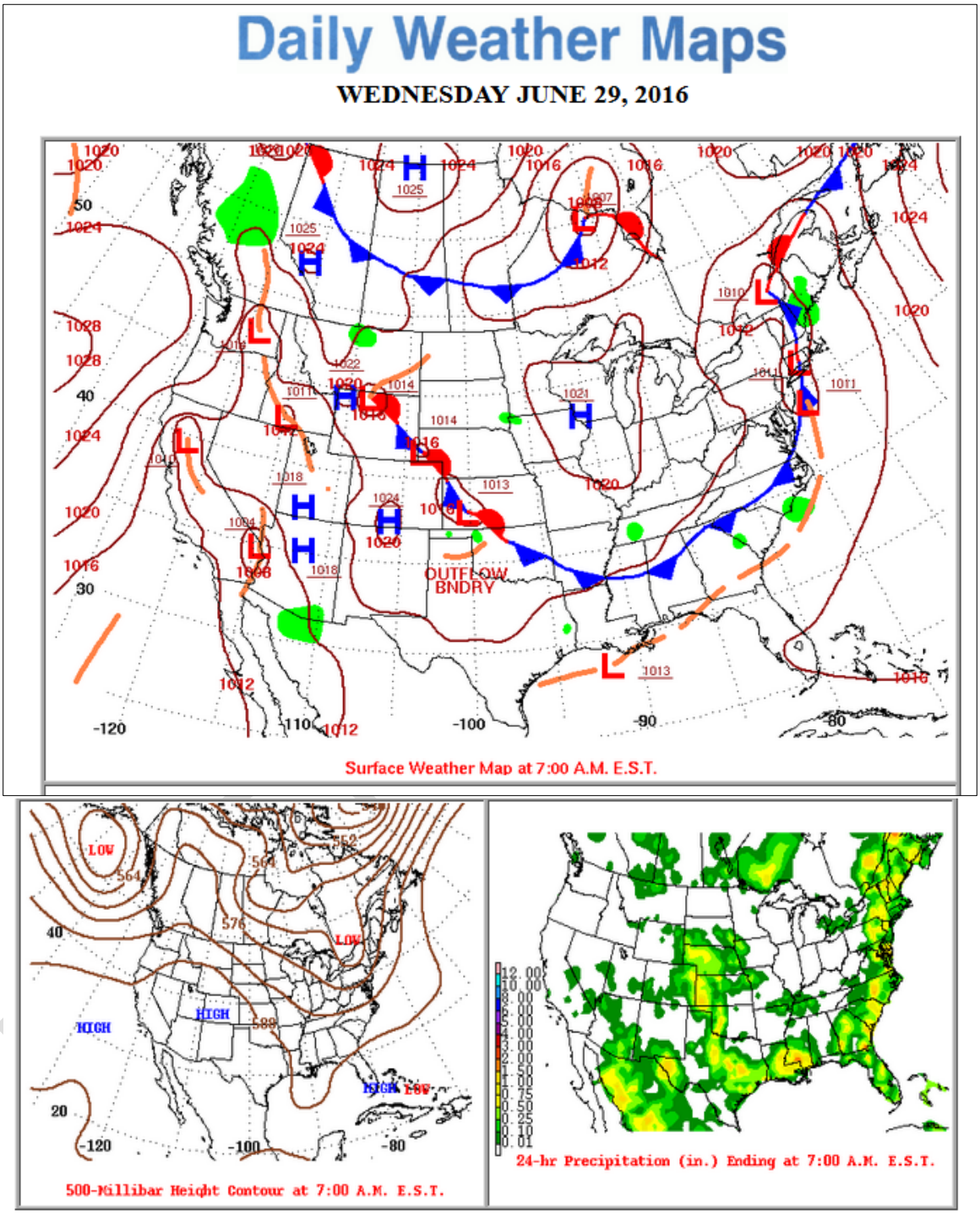


Figure 2.25: Daily Weather Map June 30, 2016

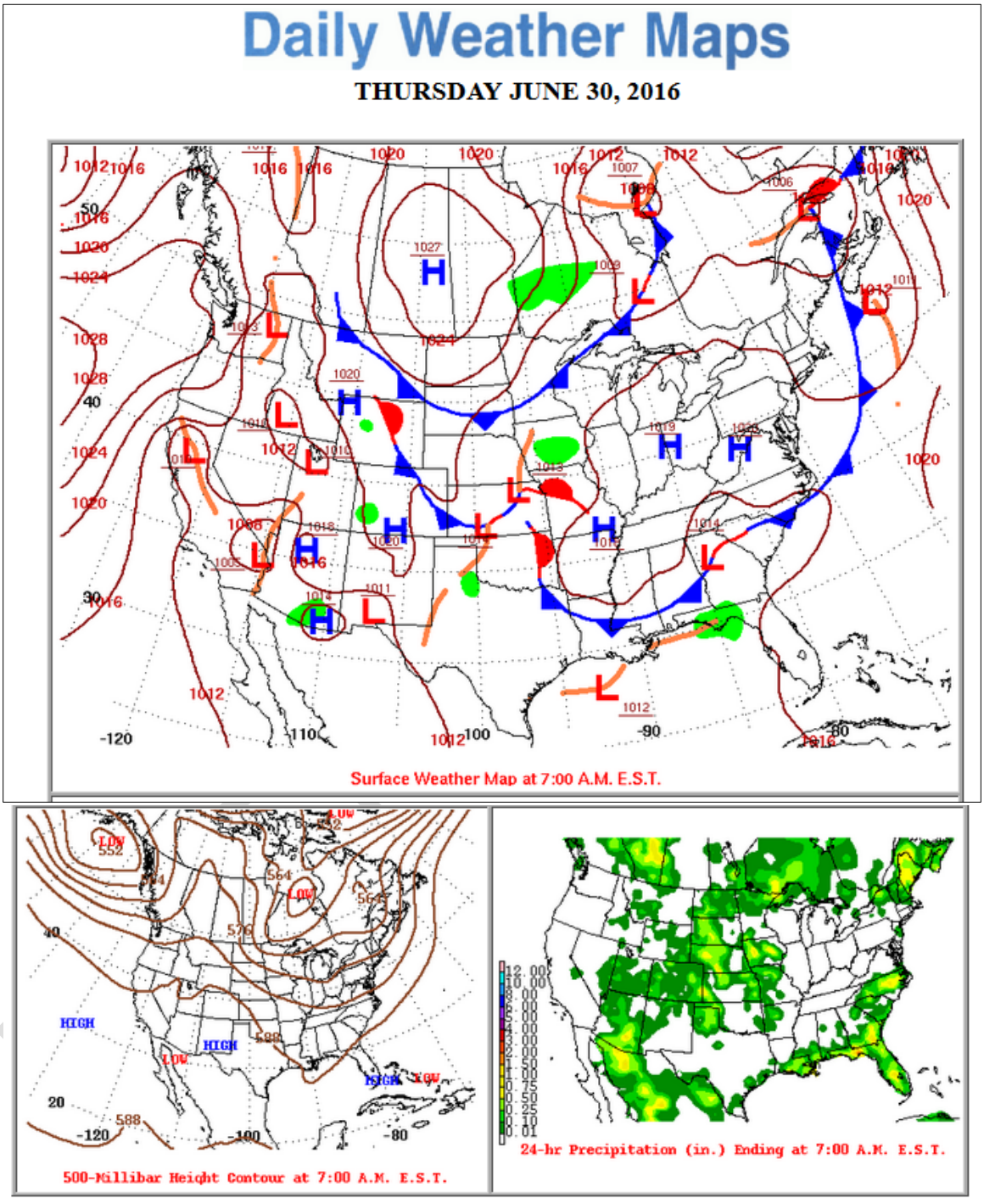


Figure 2.26: Daily Weather Map July 1, 2016

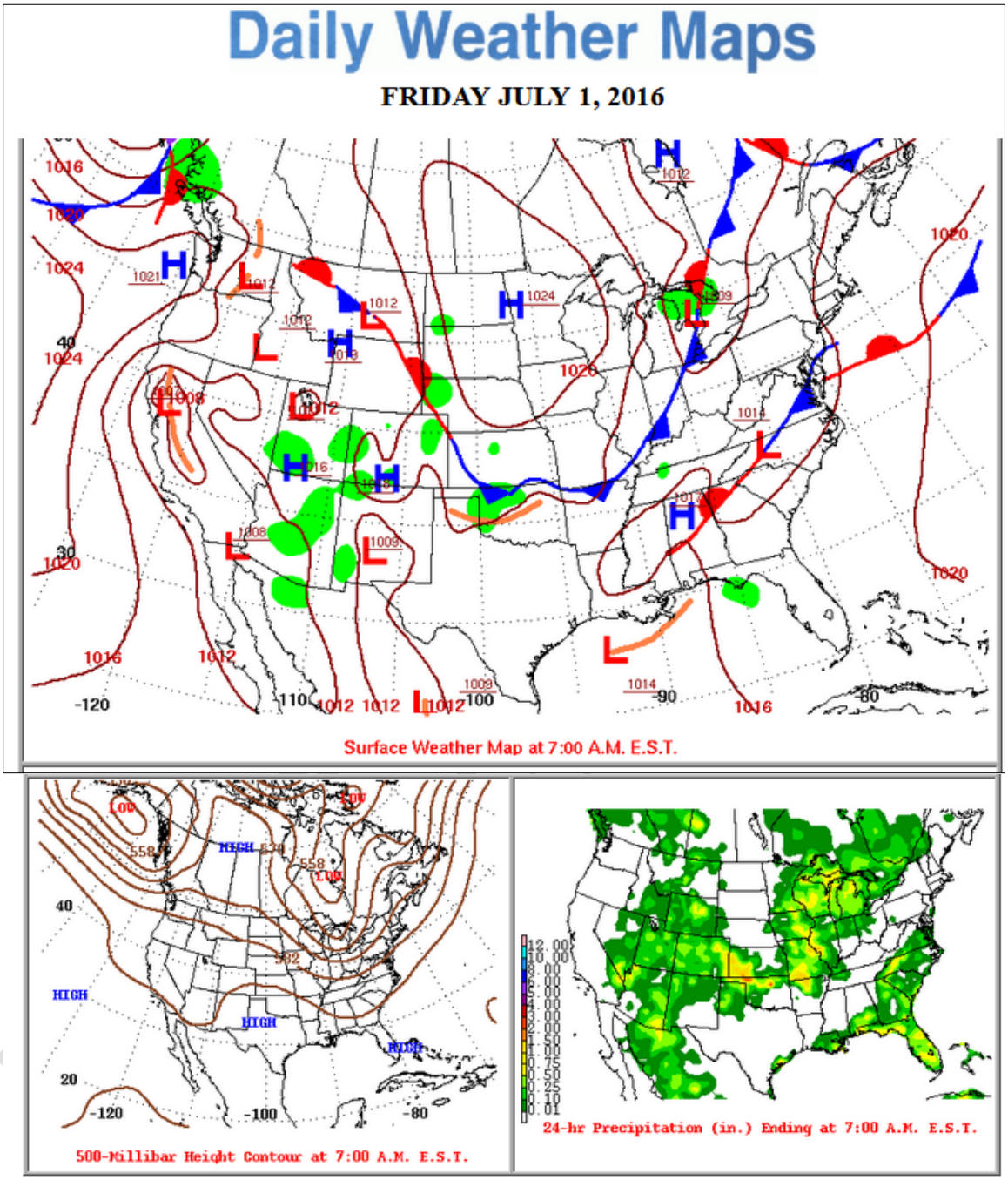


Figure 2.27: Daily Weather Map July 2, 2016

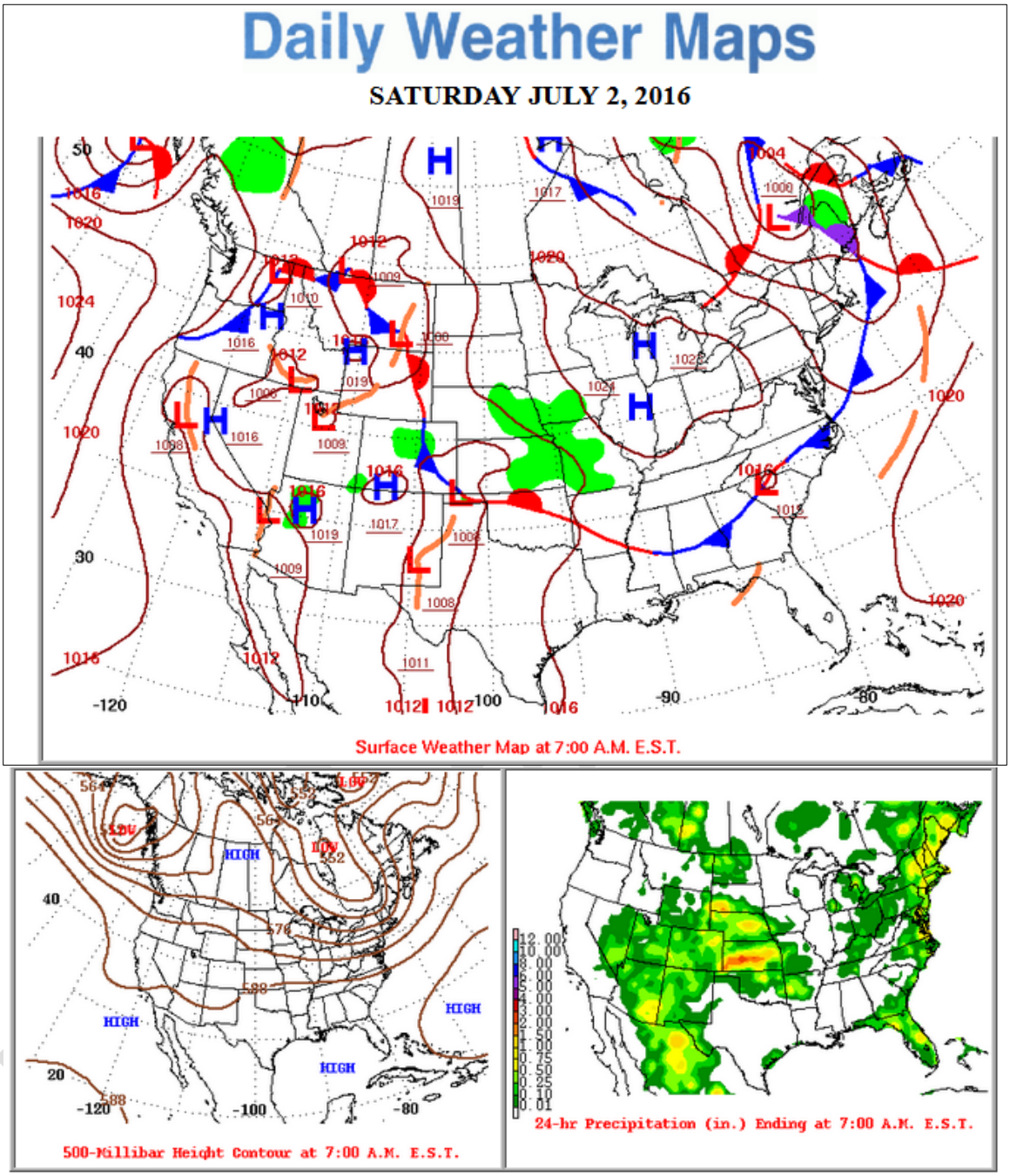


Figure 2.28: Daily Weather Map July 3, 2016

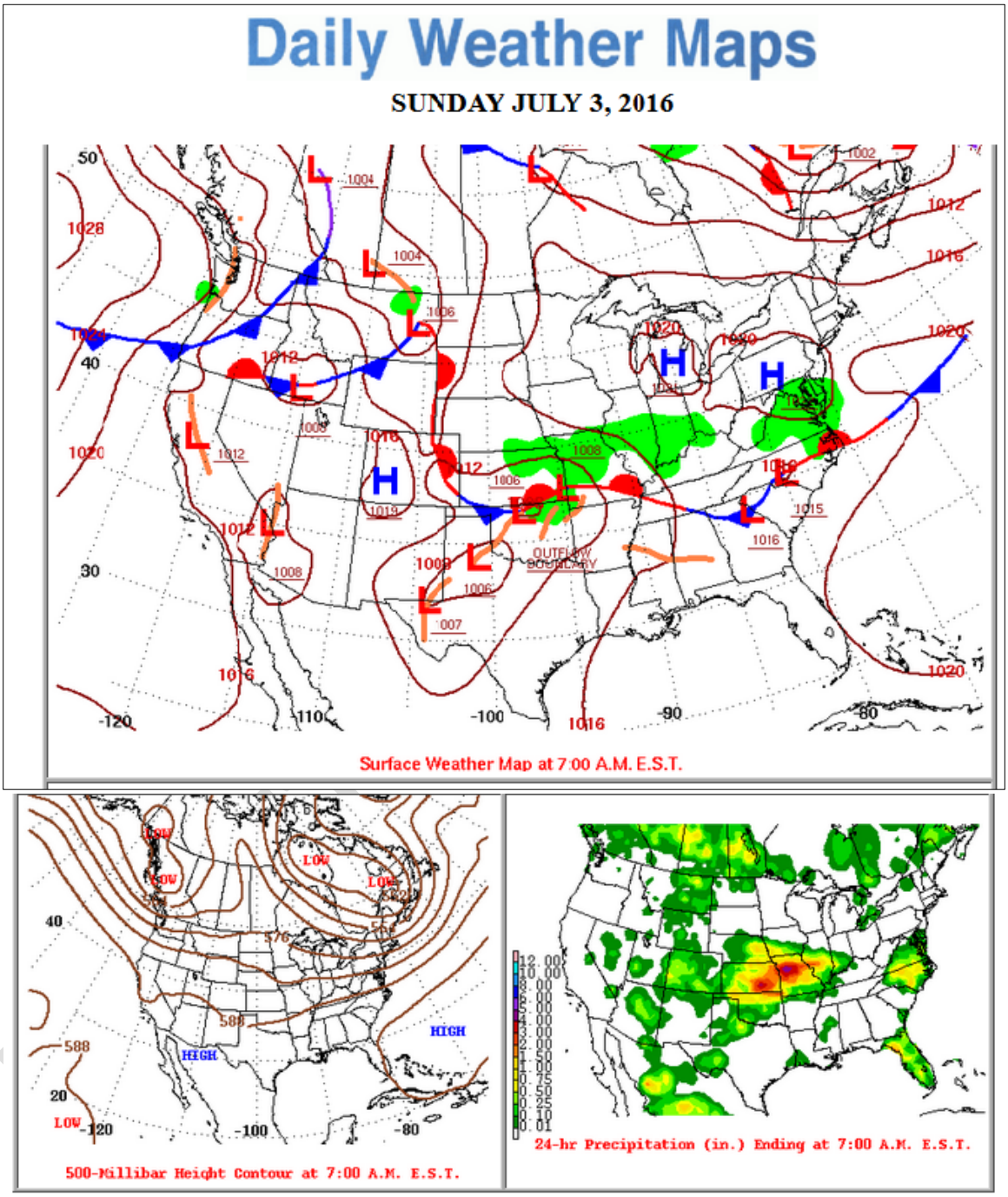


Figure 2.29: Daily Weather Map July 4, 2016

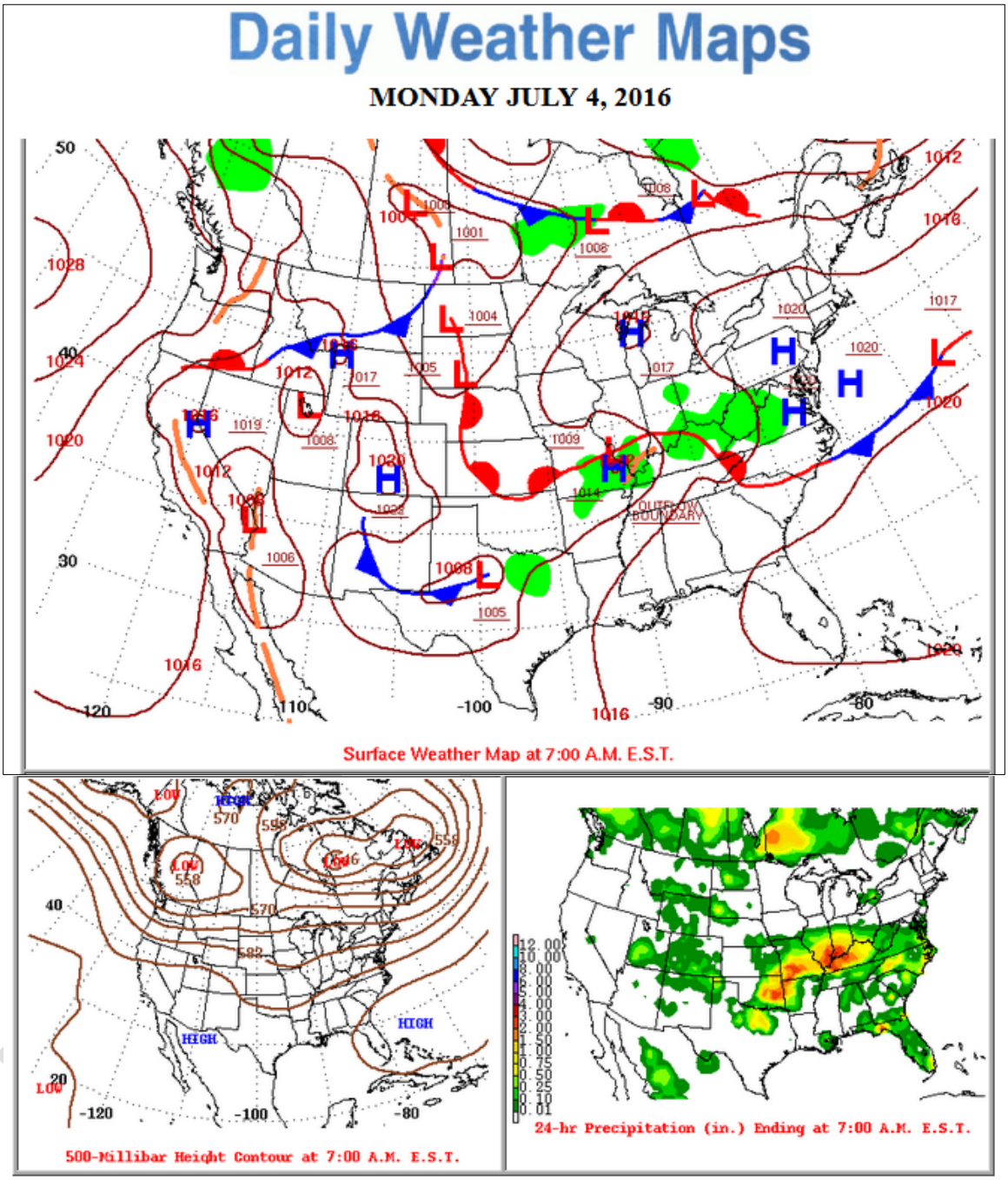
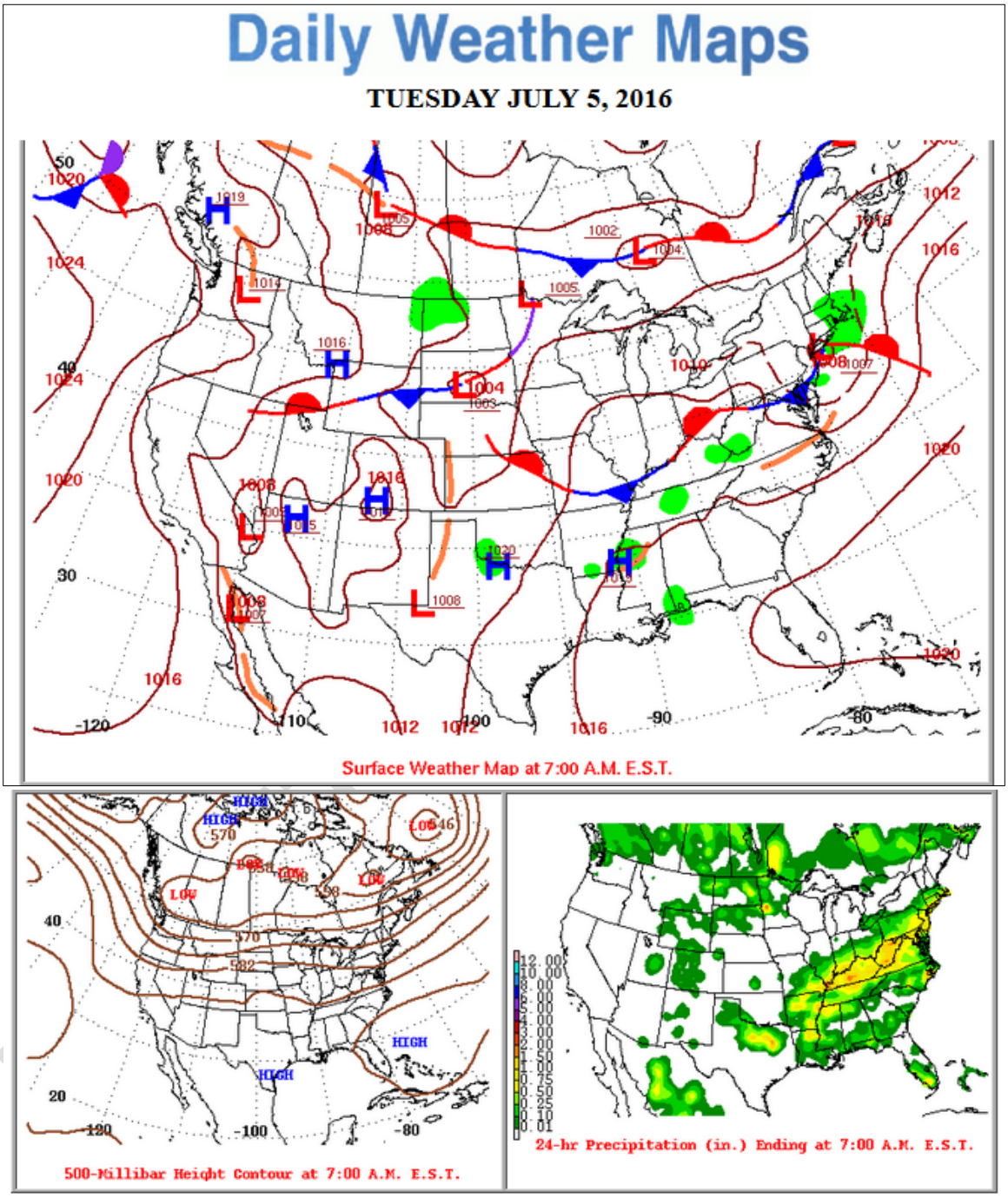


Figure 2.30: Daily Weather Map July 5, 2016



Event Weather Summary

Temperature and wind speed data were analyzed days before, during, and after the exceptional events. June 26 and July 11, 2016 were selected as the non-event shoulder days around the event because: 1) These were regular sample days for the $PM_{2.5}$ Speciation monitor, and 2) smoke from the Trailhead Fire did not impact the Truckee Meadows. The table below summarizes the period from June 26 to July 11, 2016. Weather observations are from the Reno-Tahoe International Airport, approximately three miles southeast of the Reno3 monitoring station.

Table 2.2: Temperature and Wind Speed on Non-Event, Episode, and Exceptional Event Days

							Exceptional Event	Exceptional Event	Exceptional Event			
	Non-Event		Trailhead Fire Episode							Non-Event		
Parameter	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5		7/11
O_3												
8-hour maximum (ppm)	0.062	0.059	0.057	0.067	0.063	0.067	0.073	0.073	0.073	0.068		0.052
Maximum Temperature												
Observed (^{o}F)	98	100	101	100	100	99	97	95	93	91		86
Normal (^{o}F)	87	88	88	88	89	89	89	90	90	90		92
Wind Speed												
24-hour Observed (mph)	7.6	5.6	6.4	8.0	7.5	7.5	7.3	7.9	10.4	10.1		5.9
24-hour Normal (mph)	7.8	7.8	7.8	7.8	7.8	7.3	7.3	7.3	7.3	7.3		7.3
2-min Observed (mph)	23	20	20	24	22	22	23	28	25	25		21

The maximum temperature on June 26 was higher than the exceptional event, but 8-hour O_3 concentrations were 0.011 ppm lower. Temperatures on non-event days after the episode (July 5 and July 11) were 2-11 ^{o}F lower than the exceptional event and concentrations were 0.005 - 0.021 ppm lower. Washoe Zephyr Winds were present each afternoon on non-event, episode, and exceptional event days.

The weather data further support that the wildfire smoke from the Trailhead Fire affected the Reno3 monitor and increased O_3 concentrations. Unusual weather (other than transport of wildfire smoke) was not a factor contributing to the exceptional event.

2.6 Media Coverage

AQMD collaborates with the National Weather Service (NWS) and local media to provide timely notifications to the public throughout the year and especially during events such as the Trailhead Fire. AQMD leverages NWS and local media's tens of thousands of social media followers to share accurate and consistent information to the community. The AQMD, NWS, and local media all follow each other's social media. When one organization updates their social media, it's shared and delivered to the public almost immediately.

During the Trailhead Fire, Air Quality Index (AQI) forecasts and air alerts were updated daily, or more frequently, via EnviroFlash. The NWS and many of the local media outlets receive EnviroFlash updates directly or via AQMD's social media. These partnerships allow the public to receive timely information about precautions they can take to reduce exposure to the high levels of air pollution. The figures below show examples of media posts throughout the exceptional event.

In addition, air quality information was available from the AQMD website (OurCleanAir.com) and Air Quality Hotline [(775) 785-4110].

Figure 2.31: National Weather Service Tweet from June 29, 2016

Figure 2.32: KOLO8 News Tweet from July 2, 2016

Figure 2.33: KRNV News Tweet from July 2, 2016

Figure 2.34: KOLO8 News Tweet from July 3, 2016

3.0 CLEAR CAUSAL RELATIONSHIP

3.1 Introduction

This section of the demonstration addresses the technical element that there is a clear causal relationship between the wildfire event and the monitored exceedance, providing evidence that the event affected air quality. In this section, per the EPA's 2016 EER revision and the Wildfire Ozone Guidance, demonstrations should support the clear causal relationship, including: 1) a comparison of the O_3 data requested for exclusion against historical O_3 concentrations at the monitor, 2) evidence that the fire's emissions were transported to the monitor, 3) evidence that emissions from the wildfire influenced the monitored concentrations, and 4) quantification of the wildfire's emissions contributing to the monitored O_3 exceedance.

The Wildfire Ozone Guidance defines a tiering strategy for demonstrations based on the event's potential for O_3 formation and the level of evidence required to demonstrate a clear causal relationship between the event and the exceedance. This demonstration meets the purpose of the Wildfire Ozone Guidance and provides the evidence needed for EPA Region 9 to concur that an exceptional event occurred from July 2 through 4, 2016.

3.2 Tier 2 Analysis

This section explains in detail the supporting documentation of the two key factors listed in the Wildfire Ozone Guidance for a Tier 2 demonstration: 1) Key Factor #1 - Fire emissions and distance of fire(s) to affected monitoring site locations(s), and 2) Key Factor #2 - Comparisons of the event related O_3 concentrations with non-event related concentration.

<u>Key Factor #1 - Fire emissions and distance of fire(s) to affected monitoring site locations(s)</u>

To satisfy the key factor #1 for a Tier 2 demonstration, fire emissions and distance of the fire to the affected monitor was determined. The estimated daily emissions of total tons per day of NOx and VOCs divided by distance of the wildfires to the affected monitor (Q/D) was calculated. The Wildfire Ozone Guidance recommends that the Q/D value in tons per day per kilometer (tpd/km) should be greater than or equal to 100 tpd/km.

The BlueSky Playground tool 2.0 beta was used to estimate the emissions of NOx and VOCs emitted from the Trailhead Fire from June 29 through July 4, 2016. Emissions were determined by using the following inputs: 1) Latitude and Longitude (38.97/-120.854) of fire origination, 2) Emission Type = "Wildfire", 3) Fuel Moisture Condition = "Very Dry", and 4) FCCS Fuelbed # = default by location. NOx and VOCs were summed to obtain total emissions (Q) and distance from the fire location to the Reno3 monitor was determined for distance (D). Because emissions from the smoke plume that began to impact the Truckee Meadows on June 29, 2016 did not dissipate completely each day, it is safe to assume that NOx and VOC emissions accumulated in the valley daily leading to a higher Q/D; therefore, a multi-day Q/D was calculated. The Q/D was summed from the day before to the daily Q/D to determine a multi-day Q/D. See Table 3.1 for Q/D calculations for June 28 through July 4, 2016.

The Q/D test, in this case, does not meet the criteria for Q/D > 100 for a single day. It is important to note that the fire origination location was used to determine FCCS Fuelbed # and distance (D). This is the practical approach to using BlueSky Playground; however, it can introduce differences in both Q and D. First, as wildfires grow, the emissions are generated from polygons instead of a single point. These polygons are located away from the fire origination locations used in BlueSky Playground and can increase or decrease the actual distance from the fire to the monitor. Secondly, a change in fire location inputs for BlueSky Playground can result in a different FCCS Fuelbed # leading to different emission factors and emissions. Therefore, Q/D may not be the most accurate representation of O_3 levels produced based on the distance from the wildfire.

Table 3.1: Q/D Calculations for the Trailhead Fire

Date	Distance (km)	Acres	Emissions (tons)	Q/D (tpd/km)	Multi-day Q/D (tpd/km)
June 28, 2016	105	350	106	1.00	1.00
June 29, 2016	105	914	276	2.63	3.63
June 30, 2016	105	887	268	2.55	6.18
July 1, 2016	105	1,067	322	3.07	9.25
July 2, 2016	105	718	217	2.06	11.31
July 3, 2016	105	1,508	455	4.34	15.65
July 4, 2016	105	121	37	<1	16.00

Key Factor #2 - Comparison of Event-Related Concentrations with Historical Concentrations

A comparison of the event related O_3 concentration with non-event related high O_3 concentrations is required to satisfy the key factor #2 in a Tier 2 demonstration. Addressing key factor #2 involves demonstrating that the exceedance due to the event is either 1) in the 99th percentile (0.073 ppm) of the 5-year distribution of O_3 monitoring data, or 2) one of the four highest O_3 concentrations within 1 year. As part of demonstrating key factor #2, the relationship between the wildfire event and the O_3 exceedance, historical, non-event O_3 season concentrations were compared to the July 2 through 4, 2016 event. Time series plots of the 6-year historical (2011-2016) O_3 seasonal concentrations are shown in Figures 3.1 and 3.2, with the Reno3 O_3 exceedances represented as colored squares in each figure. Gray squares indicate the O_3 exceedances submitted in the 2015 exceptional events demonstration. The 99th percentile value for the O_3 season (June through August) is 0.073 ppm, which is the O_3 concentration for all three days of the exceptional event.

Figure 3.1: Reno3 8-Hour Daily O_3 Maximums June-August, 2011-2016

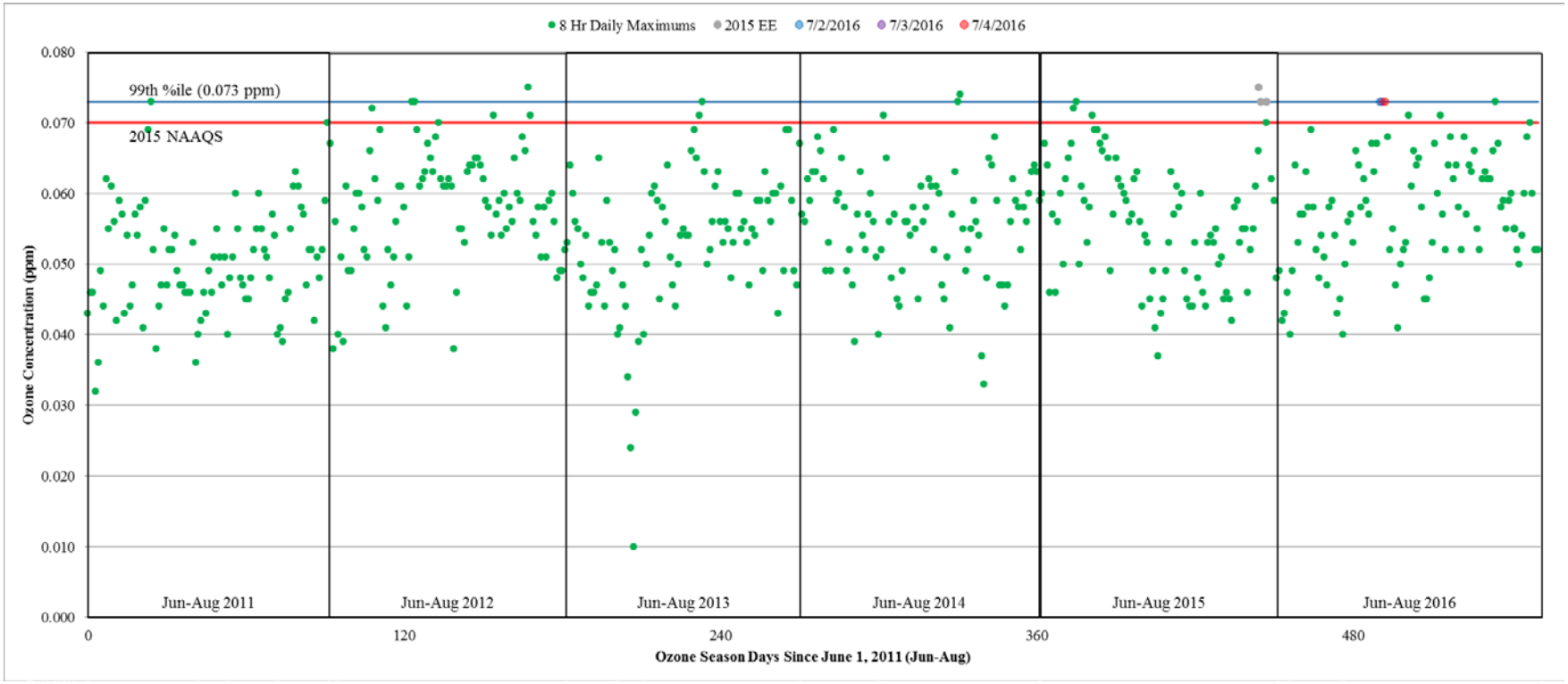
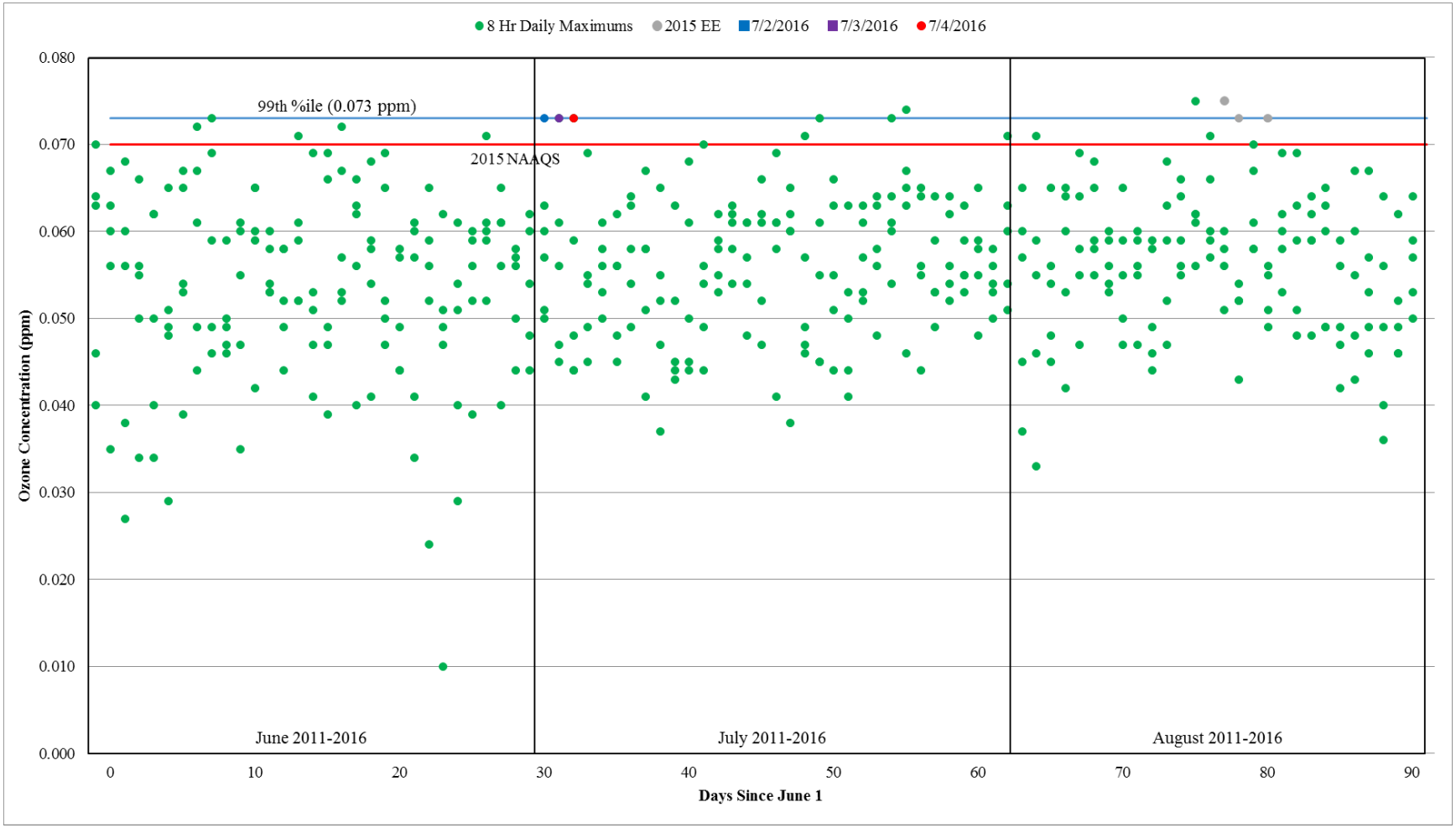


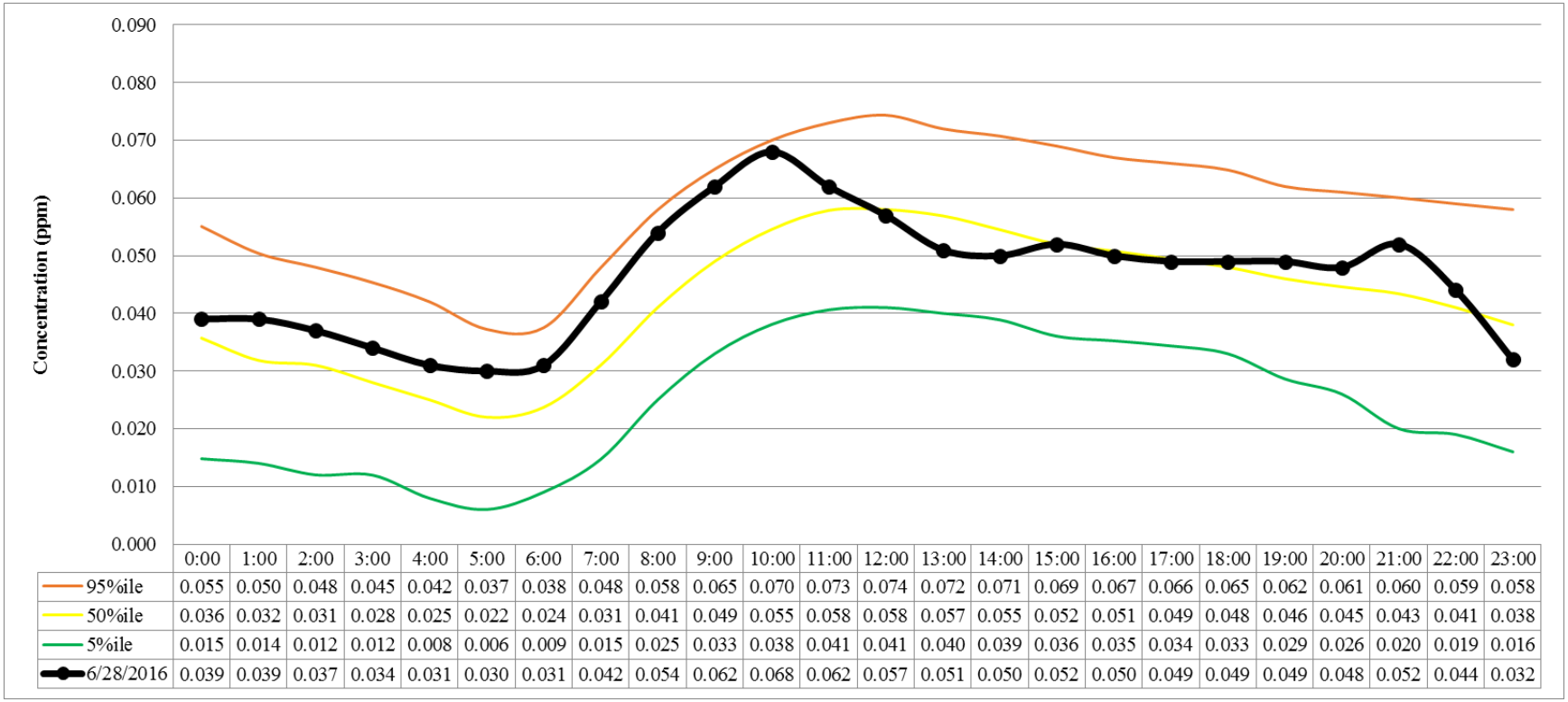
Figure 3.2: Reno3 8-Hour Daily O_3 Maximums June-August, 2011-2016



The figures below show the hourly seasonal diurnal percentiles for O_3 from 2011-2015 as compared to the concentrations of O_3 formation from June 28 through July 5, 2016 (excluding 2015 exceptional events exceedances). Ozone during non-event days June 28 and July 5, 2016 clearly show the O_3 diurnal pattern following the historical O_3 formation throughout the day, and tracks below the 95^{th} percentile. When smoke from the Trailhead Fire starts to impact the Truckee Meadows beginning June 29, 2016, O_3 starts to form later in the afternoon, similar to the exceptional event days (July 2, 3, and 4).

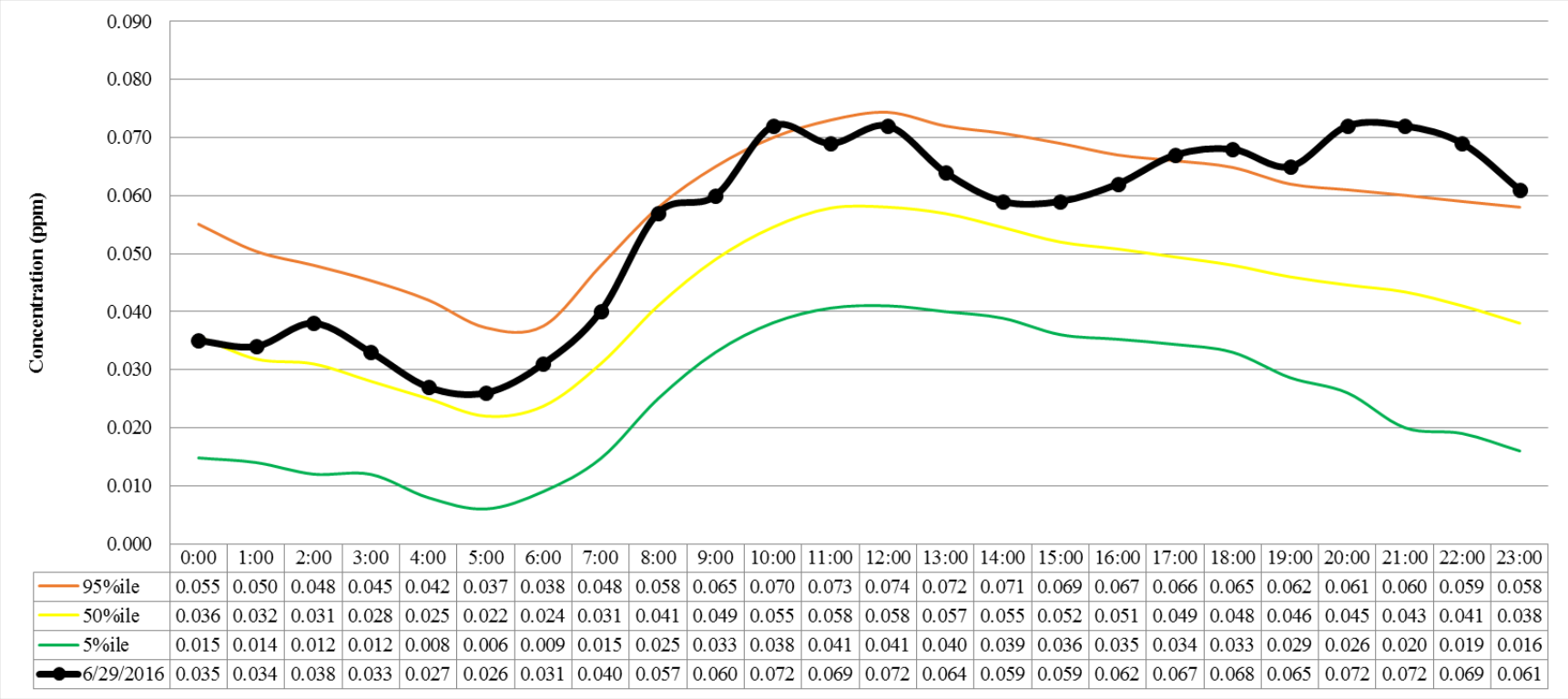
For several hours over a 24-hour period, the O_3 concentrations during the exceptional event (July 2, 3, and 4) were above the 95^{th} percentile, with the highest concentration reaching 0.018 ppm higher than non-event related concentrations. This data clearly demonstrates that smoke from the 2016 wildfire event caused an increase in O_3 concentrations at the Reno3 site on July 2, 3, and 4, 2016. This event meets both criteria for key factor #2 and therefore supports this demonstration that the exceedances at the Reno3 monitor on July 2, 3, and 4, 2016 was due to the exceptional event.

Figure 3.3: Percentiles for Hourly Seasonal O_3 for 2011-2015 with June 28, 2016



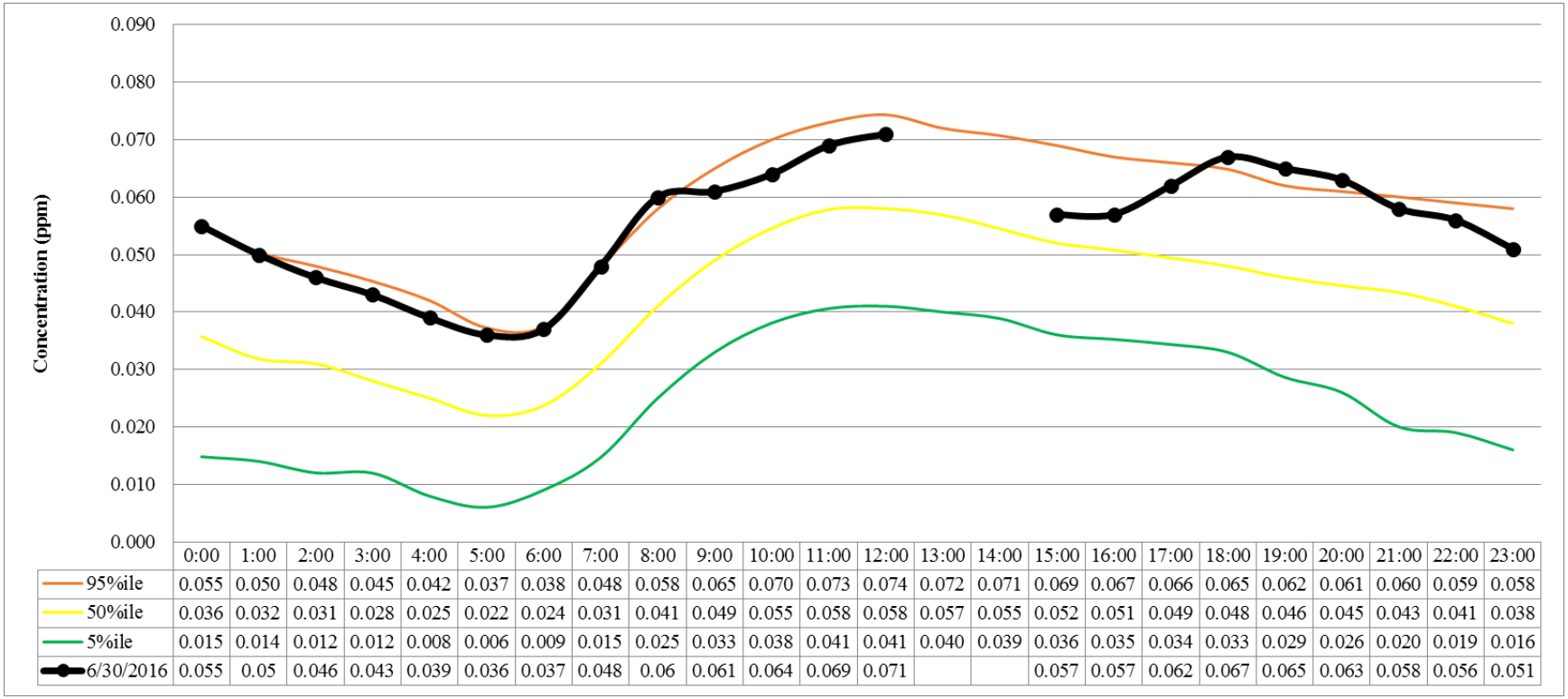
	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016
6/28/2016	0.039	0.039	0.037	0.034	0.031	0.030	0.031	0.042	0.054	0.062	0.068	0.062	0.057	0.051	0.050	0.052	0.050	0.049	0.049	0.049	0.048	0.052	0.044	0.032

Figure 3.4: Percentiles for Hourly Seasonal O_3 for 2011-2015 with June 29, 2016



	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016
6/29/2016	0.035	0.034	0.038	0.033	0.027	0.026	0.031	0.040	0.057	0.060	0.072	0.069	0.072	0.064	0.059	0.059	0.062	0.067	0.068	0.065	0.072	0.072	0.069	0.061

Figure 3.5: Percentiles for Hourly Seasonal O_3 for 2011-2015 with June 30, 2016



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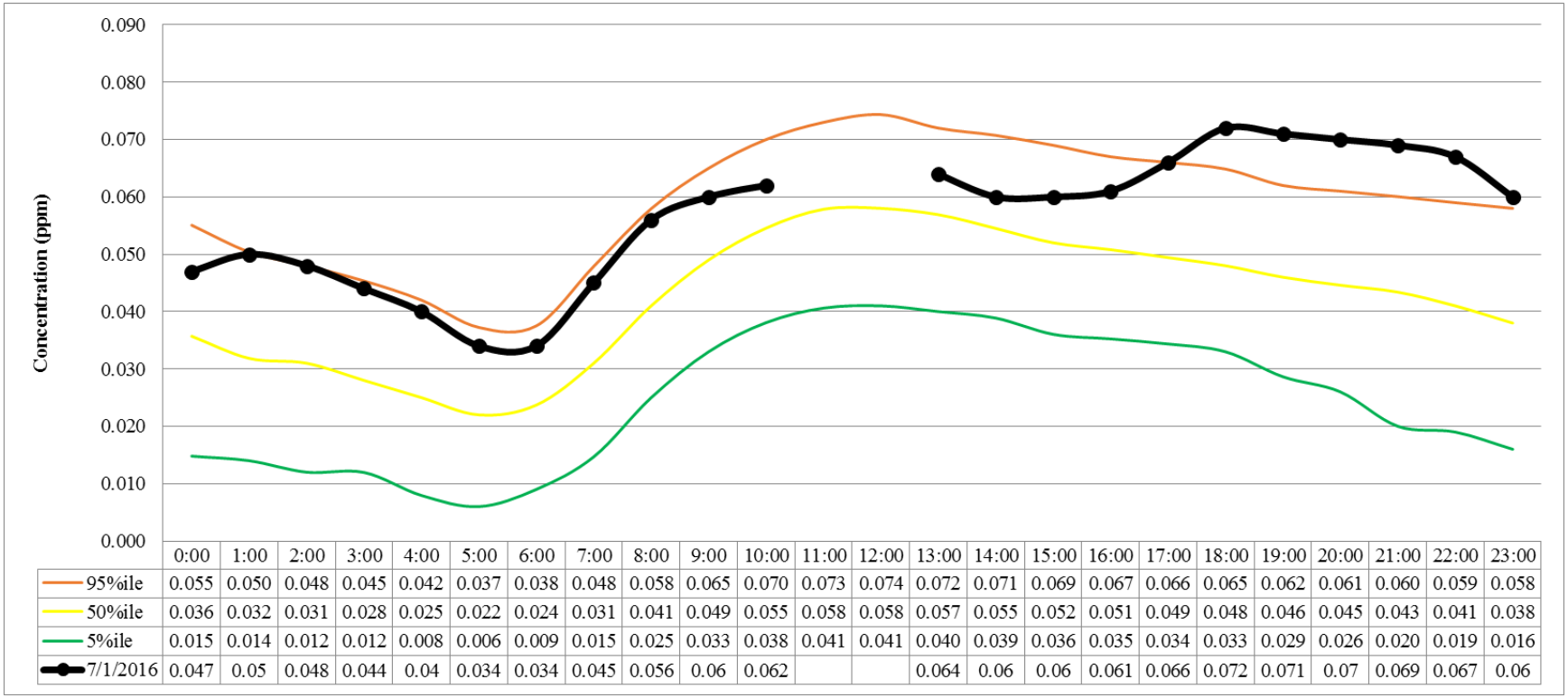
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016
6/30/2016	0.055	0.05	0.046	0.043	0.039	0.036	0.037	0.048	0.06	0.061	0.064	0.069	0.071			0.057	0.057	0.062	0.067	0.065	0.063	0.058	0.056	0.051

Figure 3.6: Percentiles for Hourly Seasonal O_3 for 2011-2015 with July 1, 2016



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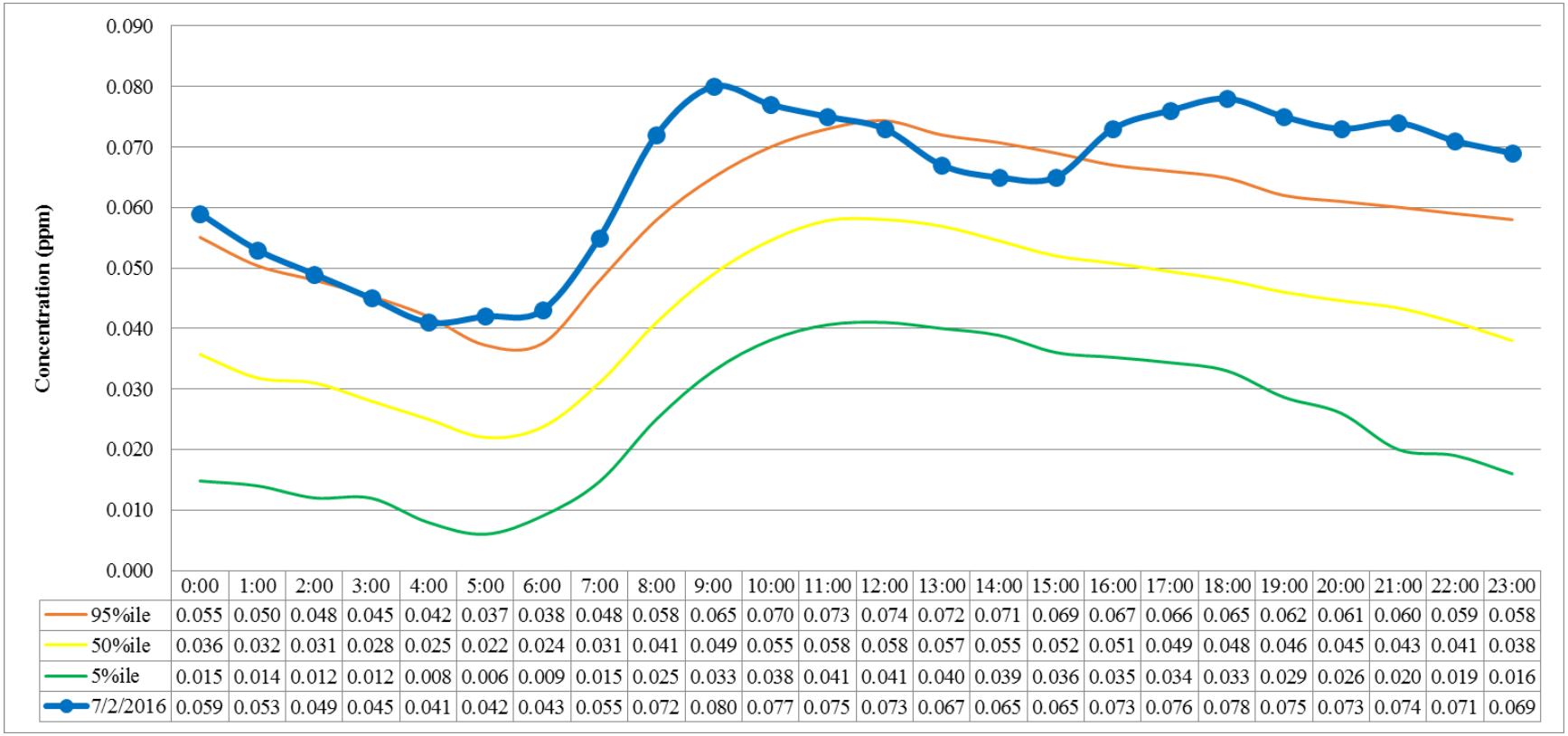
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016
7/1/2016	0.047	0.05	0.048	0.044	0.04	0.034	0.034	0.045	0.056	0.06	0.062			0.064	0.06	0.06	0.061	0.066	0.072	0.071	0.07	0.069	0.067	0.06

Figure 3.7: Percentiles for Hourly Seasonal O_3 for 2011-2015 with July 2, 2016



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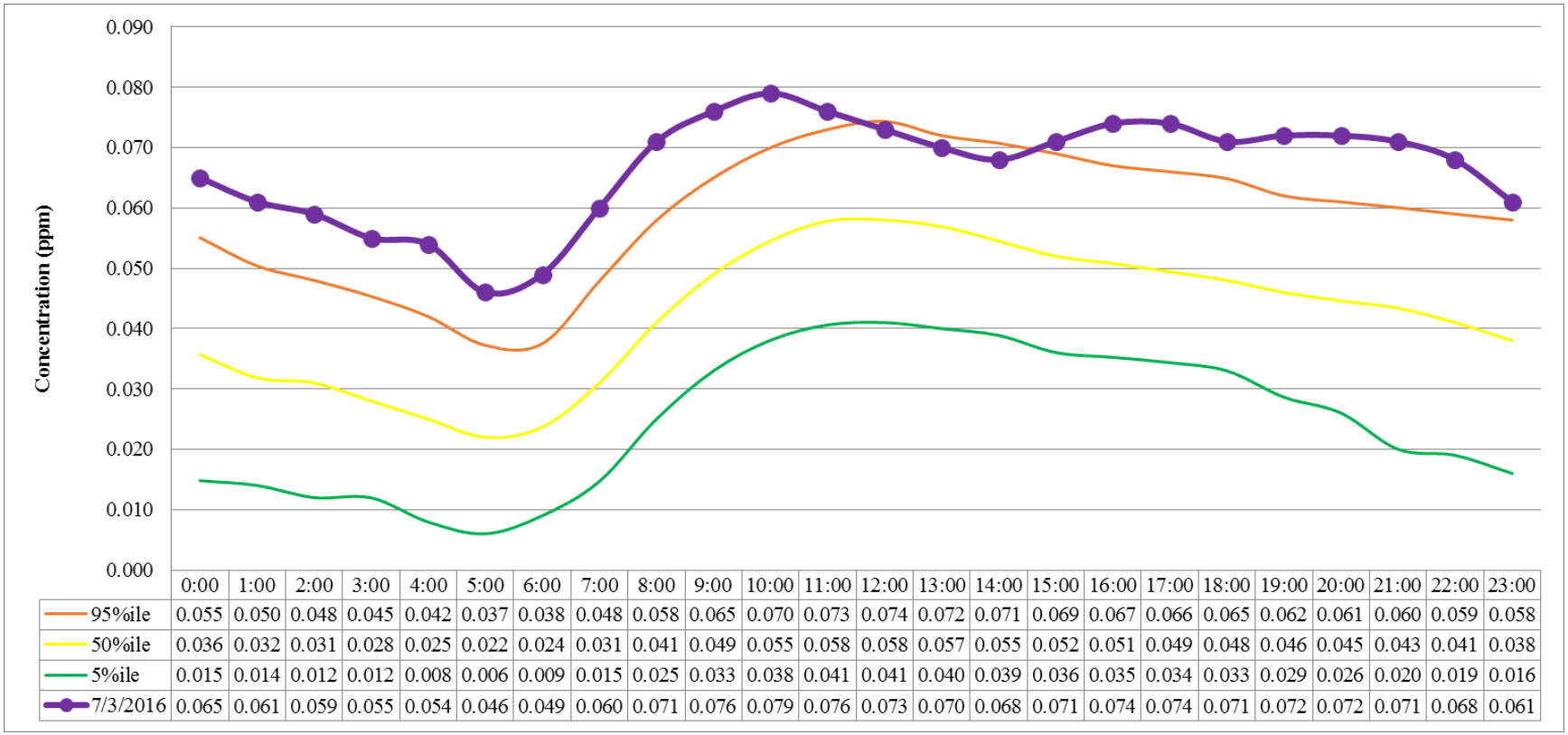
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016
7/2/2016	0.059	0.053	0.049	0.045	0.041	0.042	0.043	0.055	0.072	0.080	0.077	0.075	0.073	0.067	0.065	0.065	0.073	0.076	0.078	0.075	0.073	0.074	0.071	0.069

Figure 3.8: Percentiles for Hourly Seasonal O_3 for 2011-2015 with July 3, 2016



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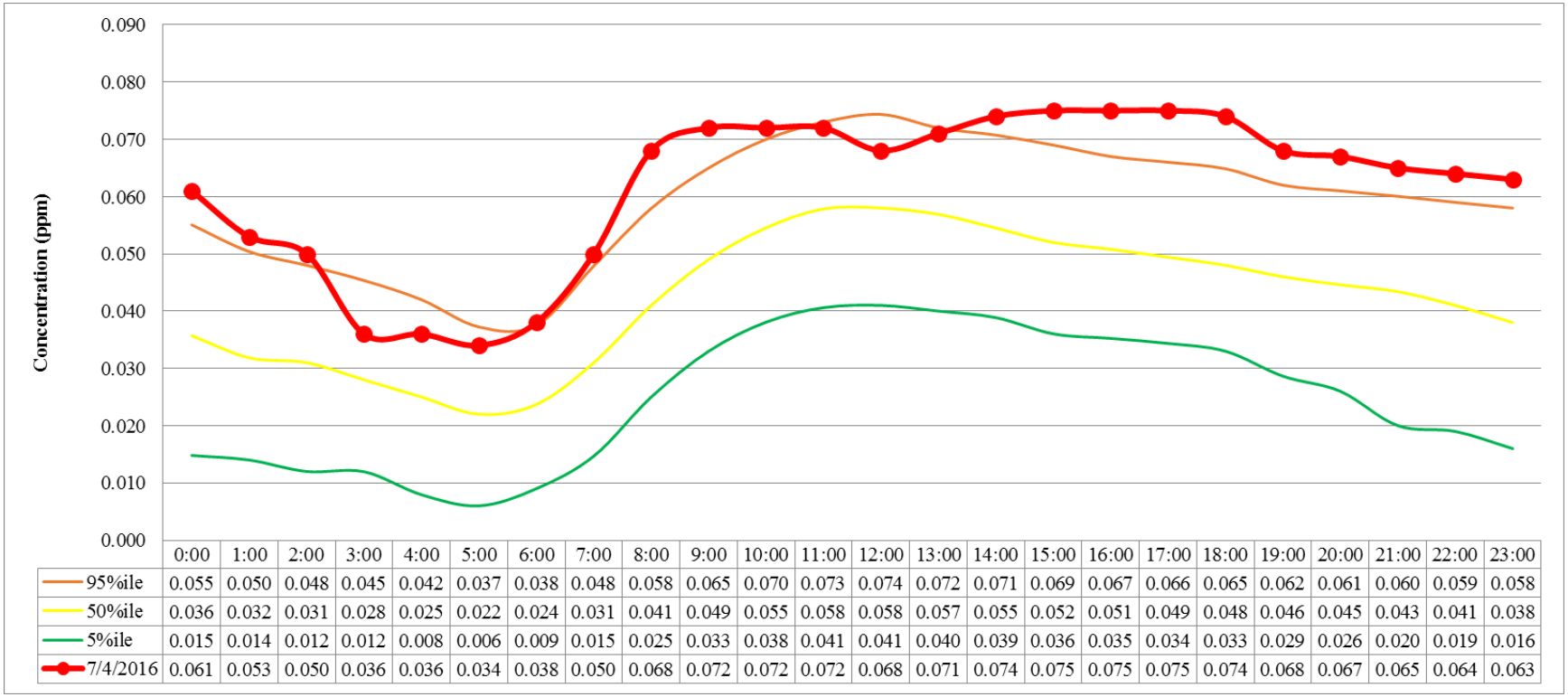
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016
7/3/2016	0.065	0.061	0.059	0.055	0.054	0.046	0.049	0.060	0.071	0.076	0.079	0.076	0.073	0.070	0.068	0.071	0.074	0.074	0.071	0.072	0.072	0.071	0.068	0.061

Figure 3.9: Percentiles for Hourly Seasonal O_3 for 2011-2015 with July 4, 2016



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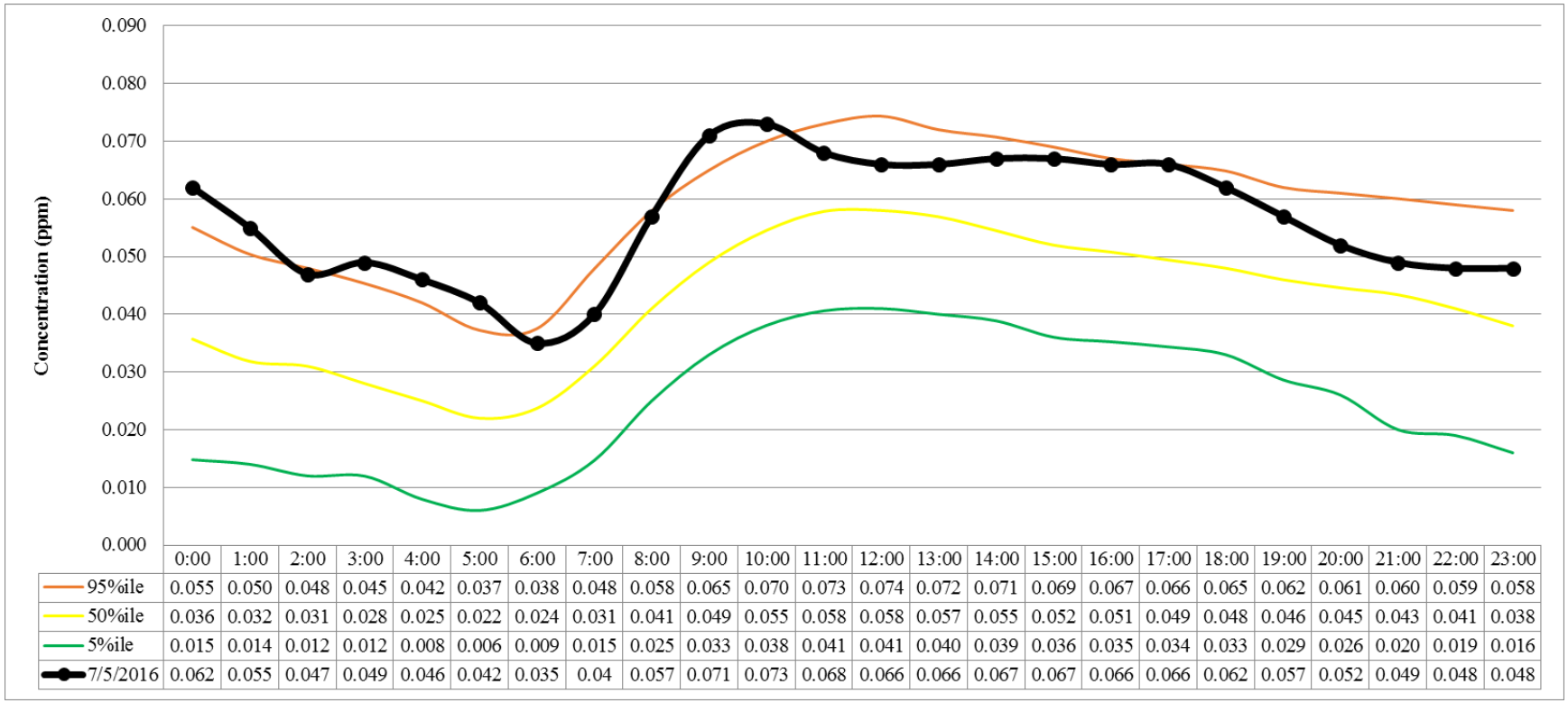
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016
7/4/2016	0.061	0.053	0.050	0.036	0.036	0.034	0.038	0.050	0.068	0.072	0.072	0.072	0.068	0.071	0.074	0.075	0.075	0.075	0.074	0.068	0.067	0.065	0.064	0.063

Figure 3.10: Percentiles for Hourly Seasonal O_3 for 2011-2015 with July 5, 2016



	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	0.055	0.050	0.048	0.045	0.042	0.037	0.038	0.048	0.058	0.065	0.070	0.073	0.074	0.072	0.071	0.069	0.067	0.066	0.065	0.062	0.061	0.060	0.059	0.058
50%ile	0.036	0.032	0.031	0.028	0.025	0.022	0.024	0.031	0.041	0.049	0.055	0.058	0.058	0.057	0.055	0.052	0.051	0.049	0.048	0.046	0.045	0.043	0.041	0.038
5%ile	0.015	0.014	0.012	0.012	0.008	0.006	0.009	0.015	0.025	0.033	0.038	0.041	0.041	0.040	0.039	0.036	0.035	0.034	0.033	0.029	0.026	0.020	0.019	0.016
7/5/2016	0.062	0.055	0.047	0.049	0.046	0.042	0.035	0.04	0.057	0.071	0.073	0.068	0.066	0.066	0.067	0.067	0.066	0.066	0.062	0.057	0.052	0.049	0.048	0.048

3.3 Additional Weight of Evidence to Support the Clear Causal Relationship

In addition to providing evidence for the Tier 2 key factors, the Wildfire Ozone Guidance requires additional evidence that the fire emissions were transported to the monitor. The Wildfire Ozone Guidance requires at least one of the following pieces of evidence: 1) evidence of changes in spatial/temporal patterns of O_3 and/or NOx, 2) photographic evidence of ground level smoke at the monitor, and 3) concentrations of supporting ground level measurements. The following subsections provide multiple pieces of evidence that cumulatively demonstrate emissions from the Trailhead Fire affected the Reno3 monitor. These subsections are presented by type of evidence, then detailed for each day of the episode.

3.3.1 Detected Smoke Layers and Trajectory Analysis

NOAA HMS products show detected hot spots and smoke plumes indicating possible fire locations in the United States. Satellite imagery is reviewed by an analyst to determine smoke layers, which are then estimated for thickness of the plume (light, medium, or heavy). These graphical products are available once daily.

The HYSPLIT model computes simple air parcel trajectories. Its calculation method is a hybrid between the Lagrangian approach, which uses a moving frame of reference as the air parcels move from their initial location, and the Eulerian approach, which uses a fixed three-dimensional grid as a frame of reference. HYSPLIT backward trajectories show the path an air parcel took backward in hourly steps for a specified length of time. Applications include tracking the release of radioactive material, volcanic ash, and wildfire smoke.

The following figures show the backward HYSPLIT trajectories and smoke plumes for June 28 through July 5, 2016 for 1500 PST. The maps include 24-hour backward trajectories at two different heights (1000 and 1500 meters) ending at the Reno3 monitoring site with HMS detected smoke layers for each day. The 6-hour interval markers on each trajectory correspond with the intervals on the trajectory profiles. These markers help determine the hours relative to the position and location of the trajectories. The backward trajectories demonstrate that the dense smoke plume beginning from June 28, 2016 traveled northeast to the Truckee Meadows, exacerbating $PM_{2.5}$ concentrations contributing to an increase in O_3 concentrations on July 2, 3, and 4, 2016. Additional forward and backward trajectories for June 28 through July 5, 2016 are in Appendix F.

Figure 3.11: 24-Hour Backward HYSPLIT Trajectories and
HMS Detected Smoke Plume on June 28, 2016

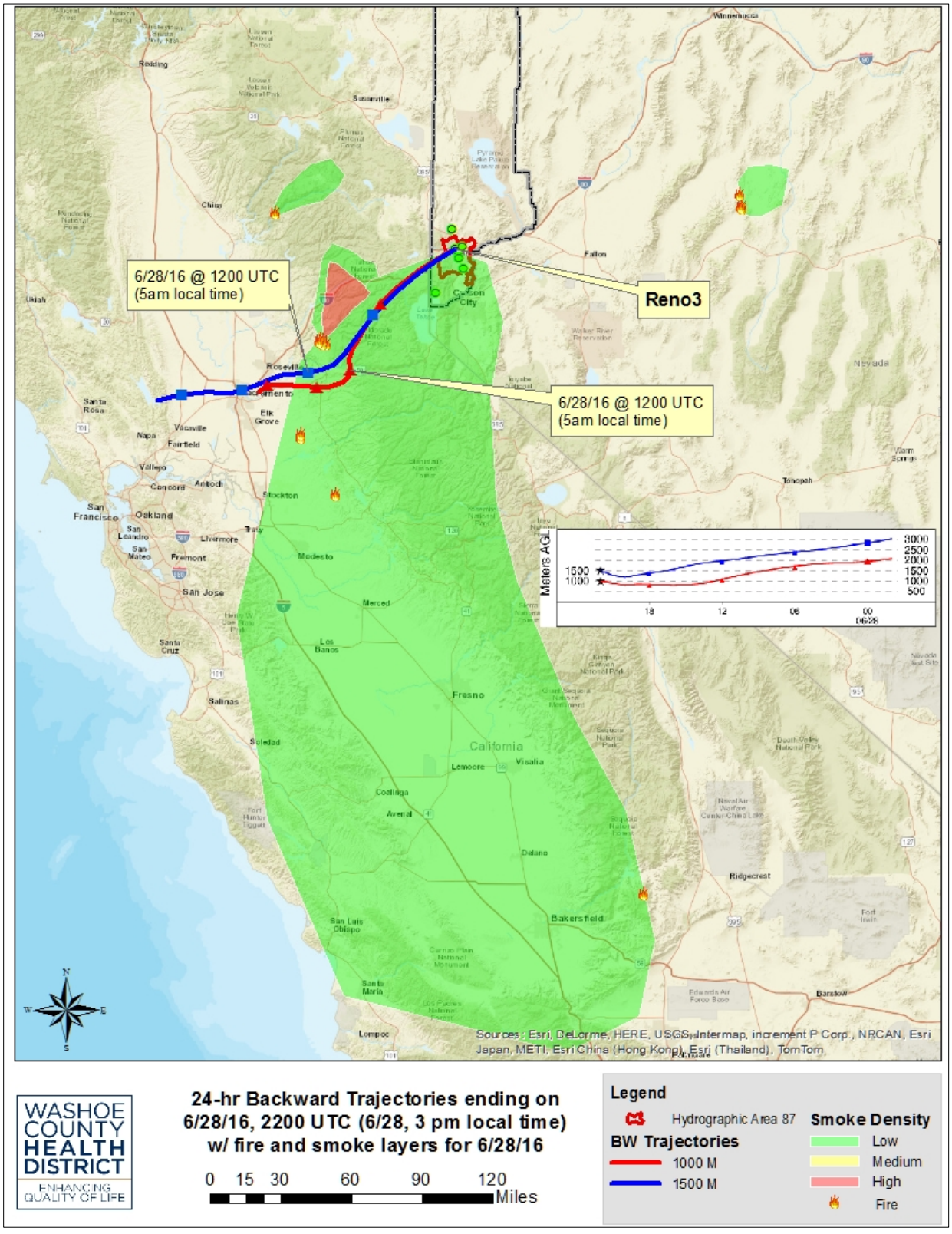


Figure 3.12: 24-Hour Backward HYSPLIT Trajectories and
HMS Detected Smoke Plume on June 29, 2016

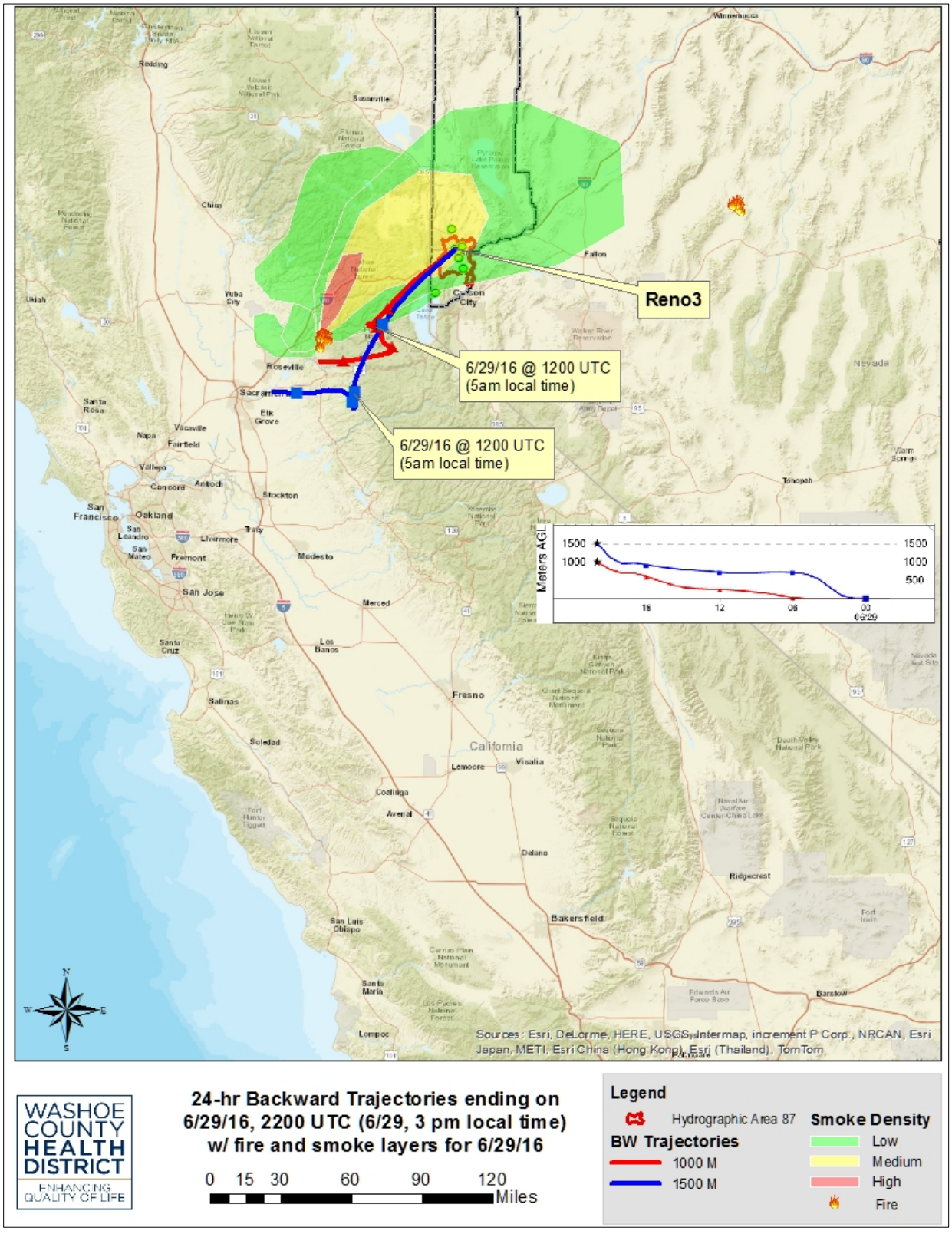


Figure 3.13: 24-Hour Backward HYSPLIT Trajectories and
HMS Detected Smoke Plume on June 30, 2016

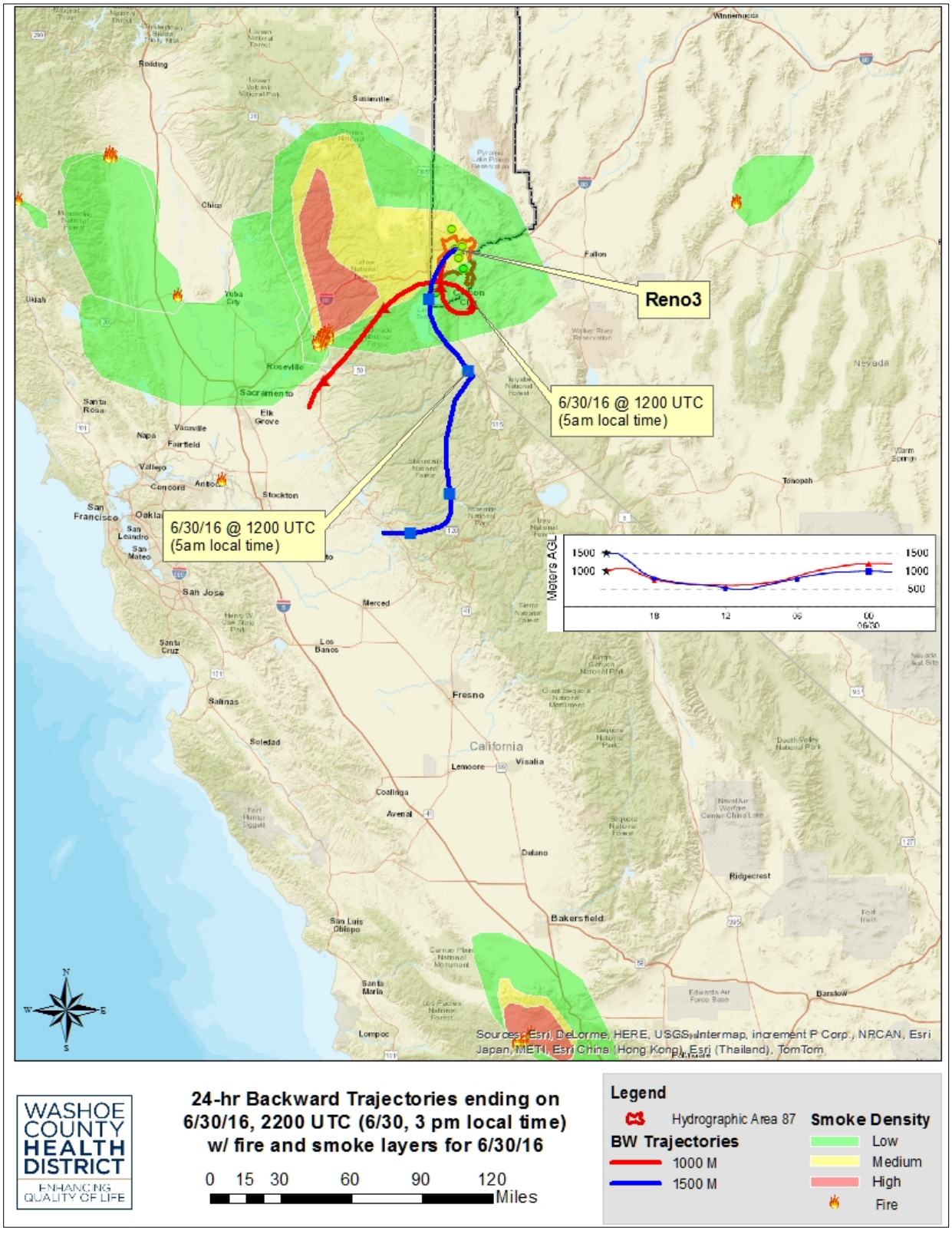


Figure 3.14: 24-Hour Backward HYSPLIT Trajectories and
HMS Detected Smoke Plume on July 1, 2016

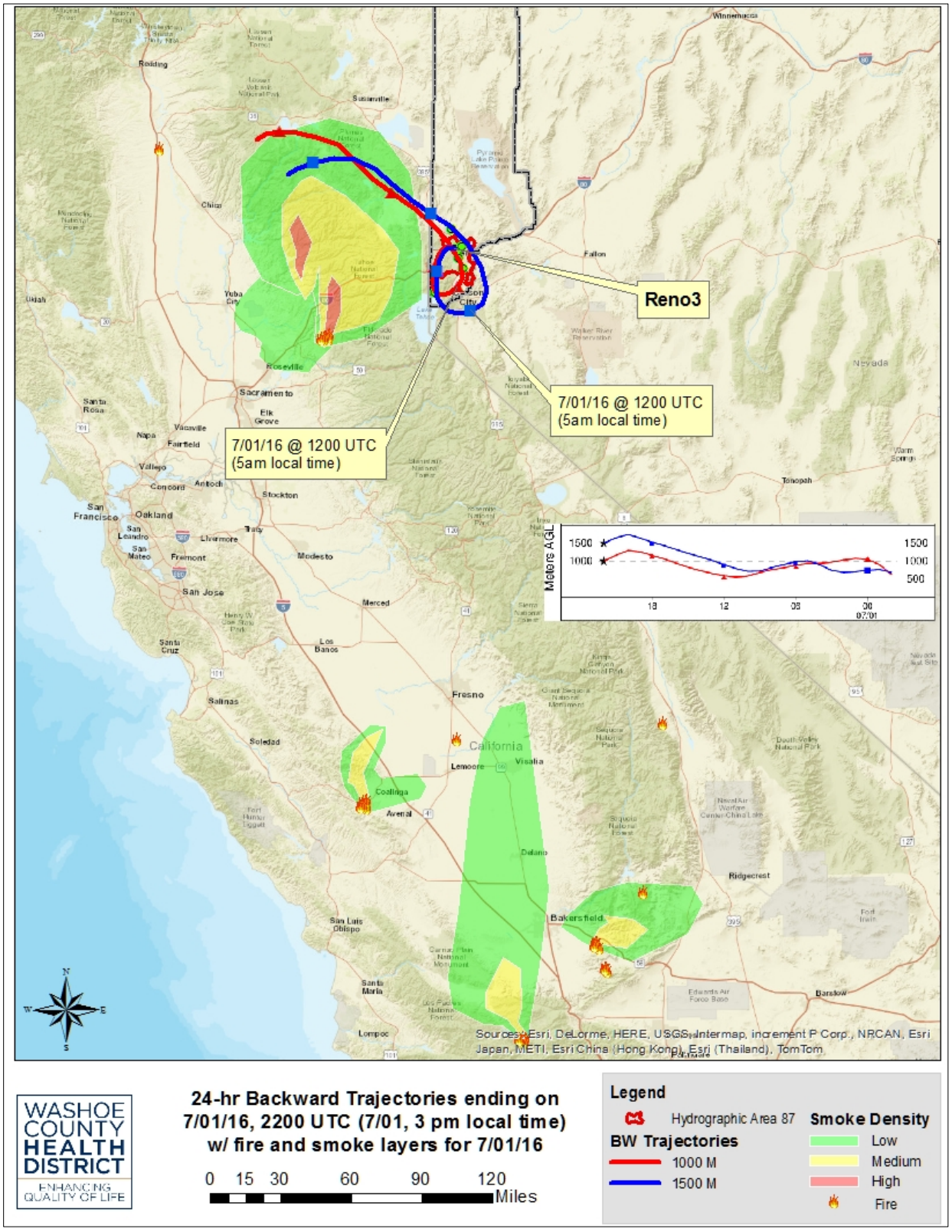


Figure 3.15: 24-Hour Backward HYSPLIT Trajectories and
HMS Detected Smoke Plume on July 2, 2016

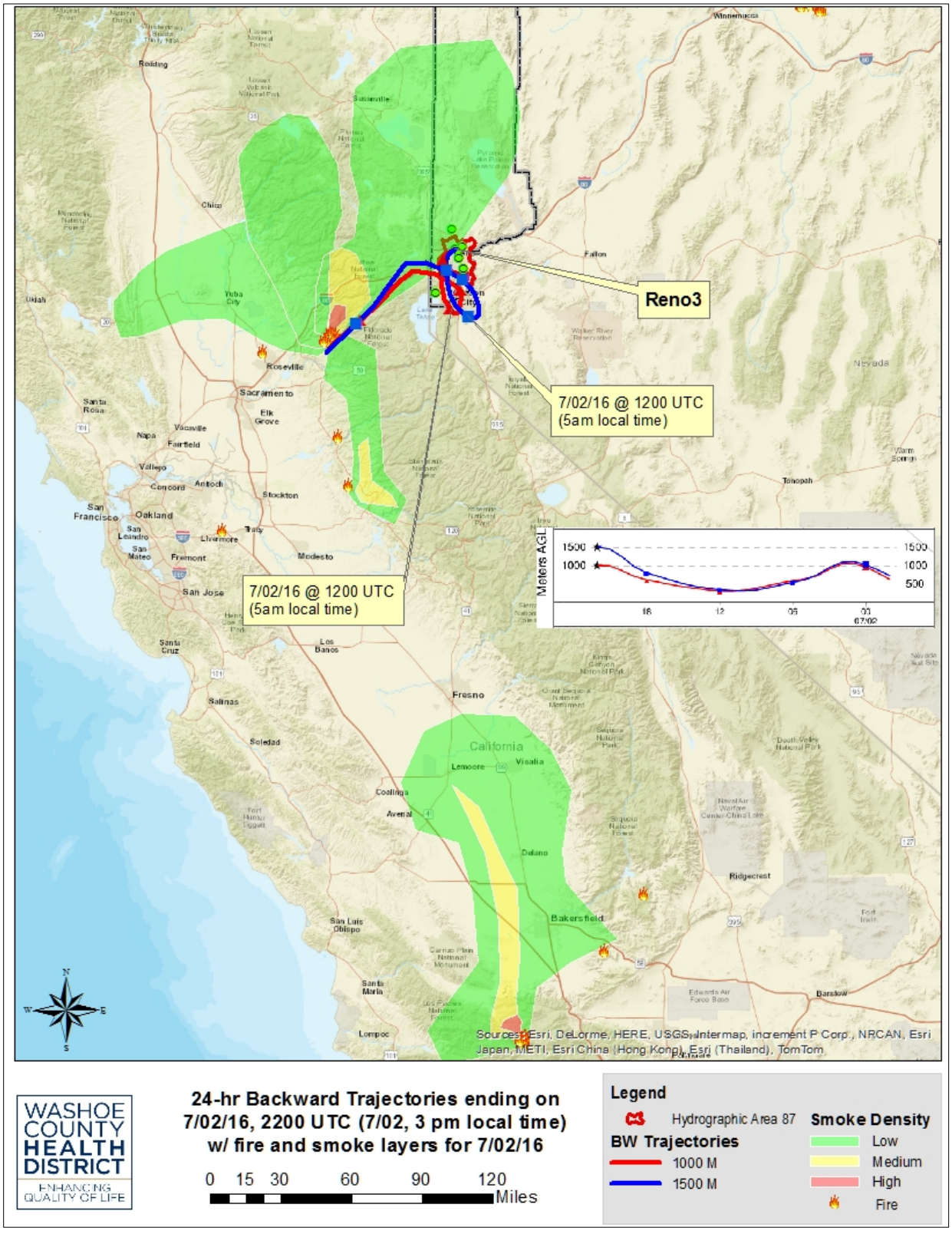


Figure 3.16: 24-Hour Backward HYSPLIT Trajectories and
HMS Detected Smoke Plume on July 3, 2016

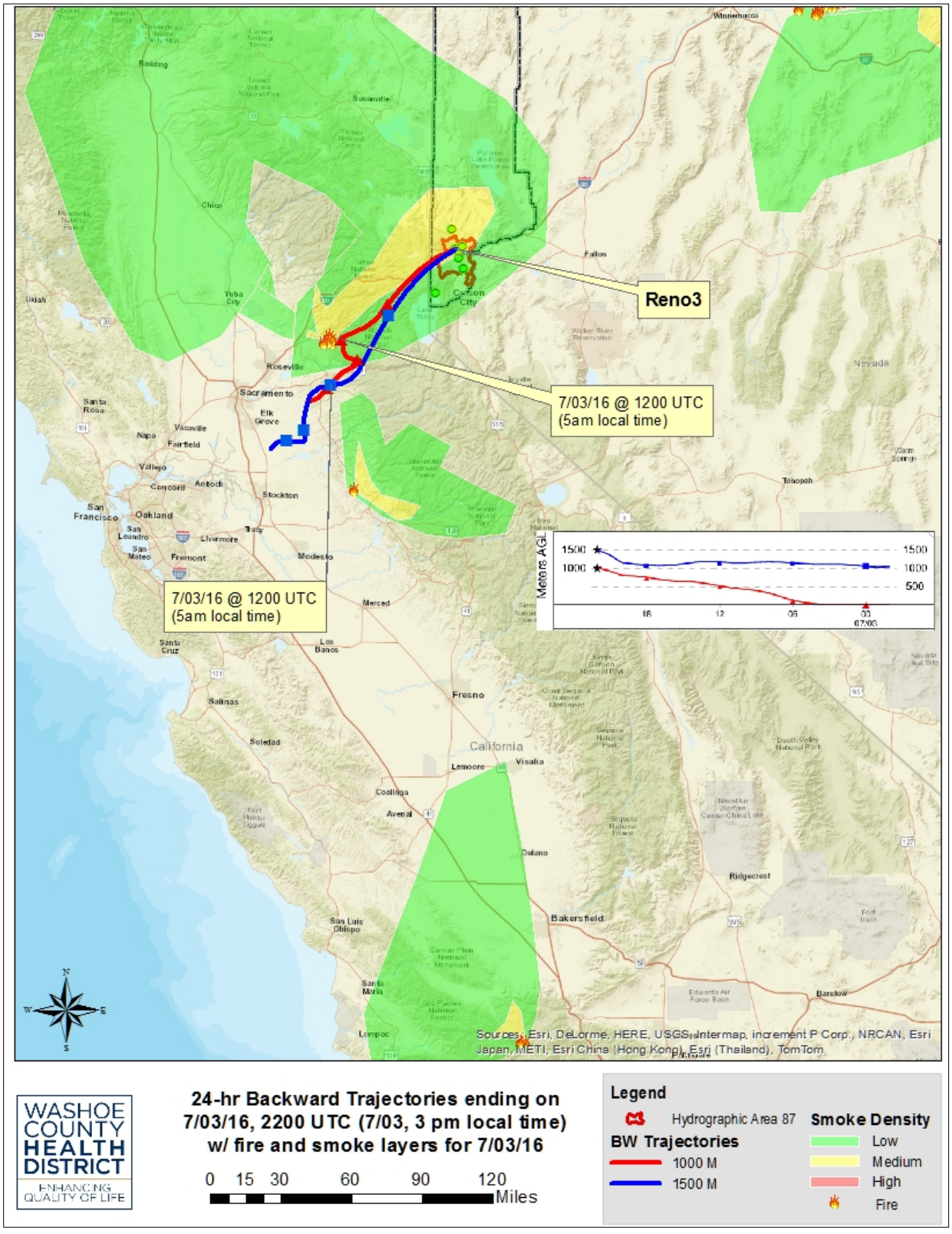


Figure 3.17: 24-Hour Backward HYSPLIT Trajectories and
HMS Detected Smoke Plume on July 4, 2016

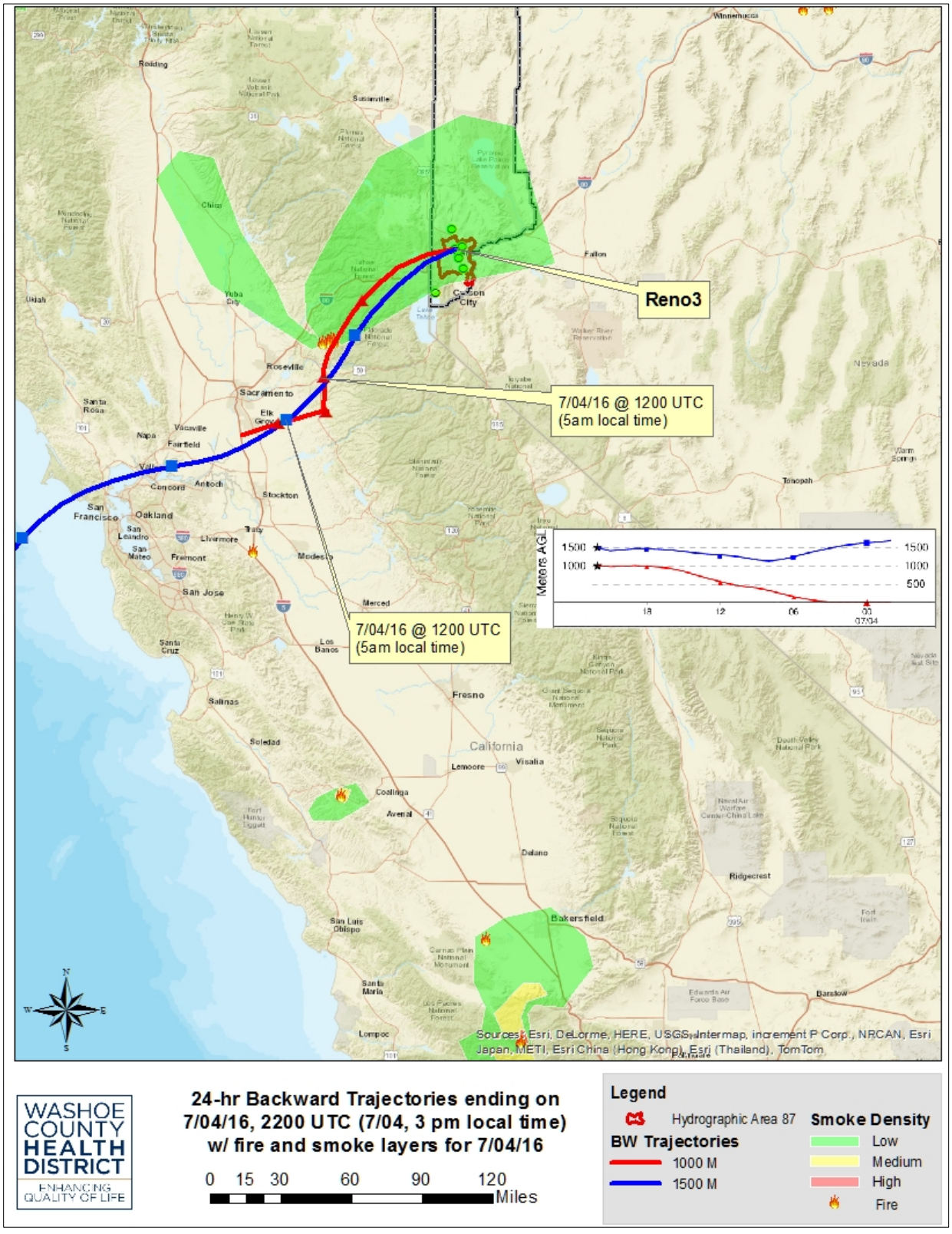
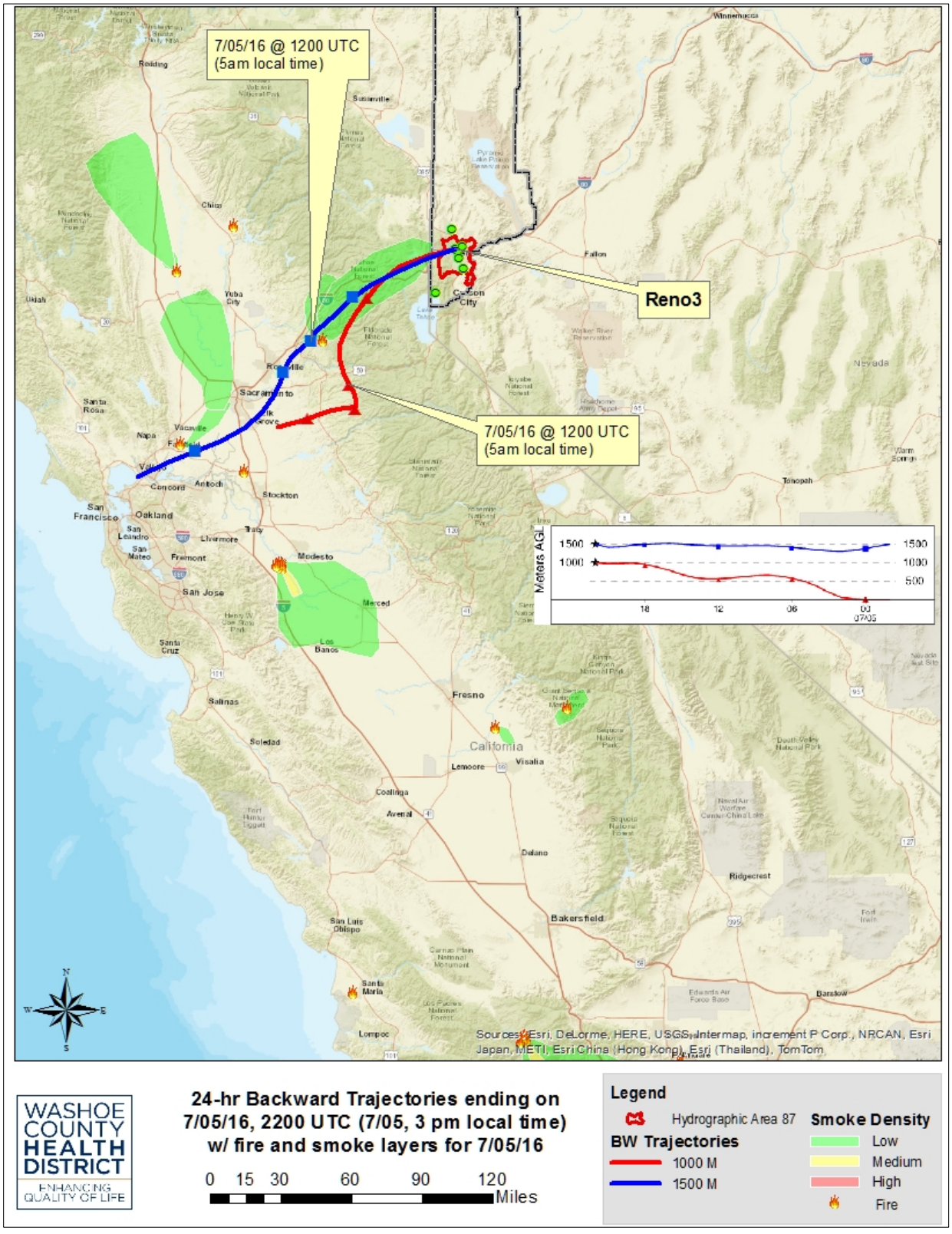


Figure 3.18: 24-Hour Backward HYSPLIT Trajectories and
HMS Detected Smoke Plume on July 5, 2016



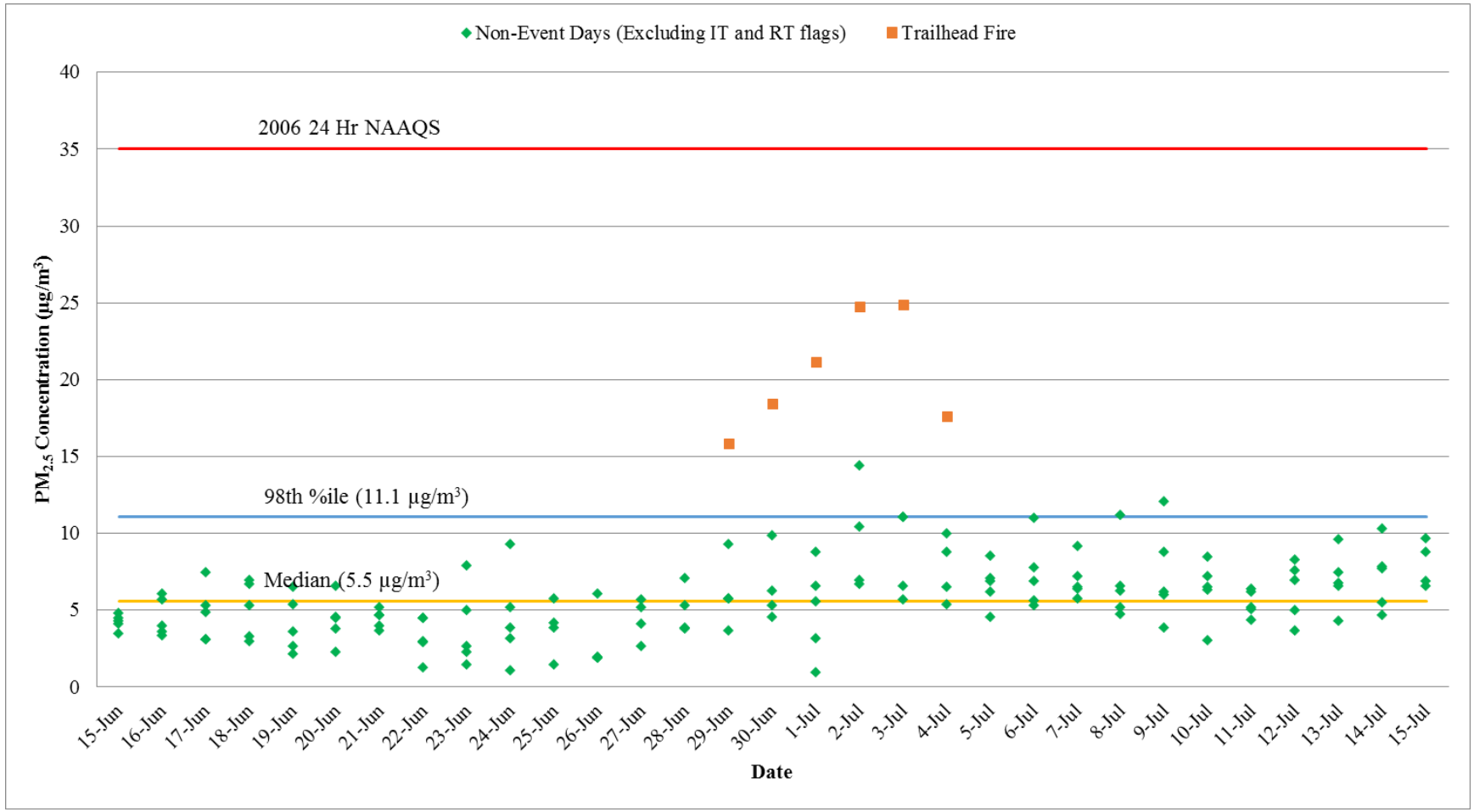
3.3.2 $PM_{2.5}$ Concentrations

$PM_{2.5}$ concentrations were unusual during the Trailhead Fire. This is demonstrated by comparing the 24-hour and diurnal $PM_{2.5}$ concentrations during the episode versus historic concentrations for June and July (2012-2016).

24-hour $PM_{2.5}$ Concentrations

Figure 3.13 shows the elevated level of the 24-hour $PM_{2.5}$ averages on July 2, 3, and 4, 2016 (indicated by the orange squares) as compared to 5-year historical concentrations for June 15 through July 15, 2012-2016. The 24-hour average $PM_{2.5}$ concentrations on July 2, 3, and 4, 2016 were all above the 98^{th} percentile with the highest concentration of 24.8 $\mu g/m^3$. This demonstrates that smoke (and $PM_{2.5}$) from the Trailhead Fire affected the Truckee Meadows.

Figure 3.19: Reno3 24-Hour $PM_{2.5}$ Averages for June through July 2012-2016



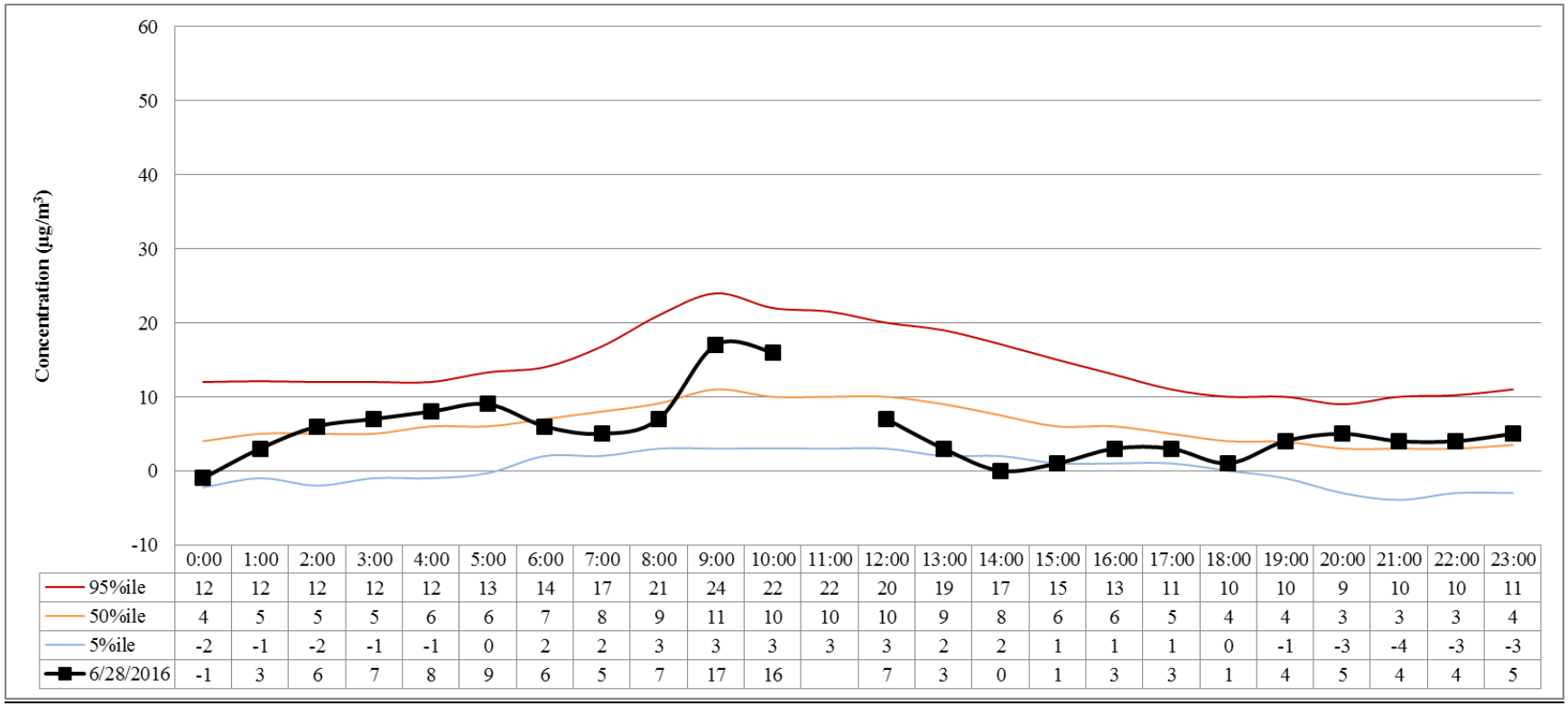
Diurnal Concentrations

Daily $PM_{2.5}$ concentrations are typically low during the summer months with a slight increase during the morning commute period. The following figures show:

1. $PM_{2.5}$ hourly diurnal patterns and percentiles for June, July, and August for the years 2011-2016 (excluding exceptional events and informationally flagged data).
2. $PM_{2.5}$ hourly concentrations from June 28 through July 5, 2016

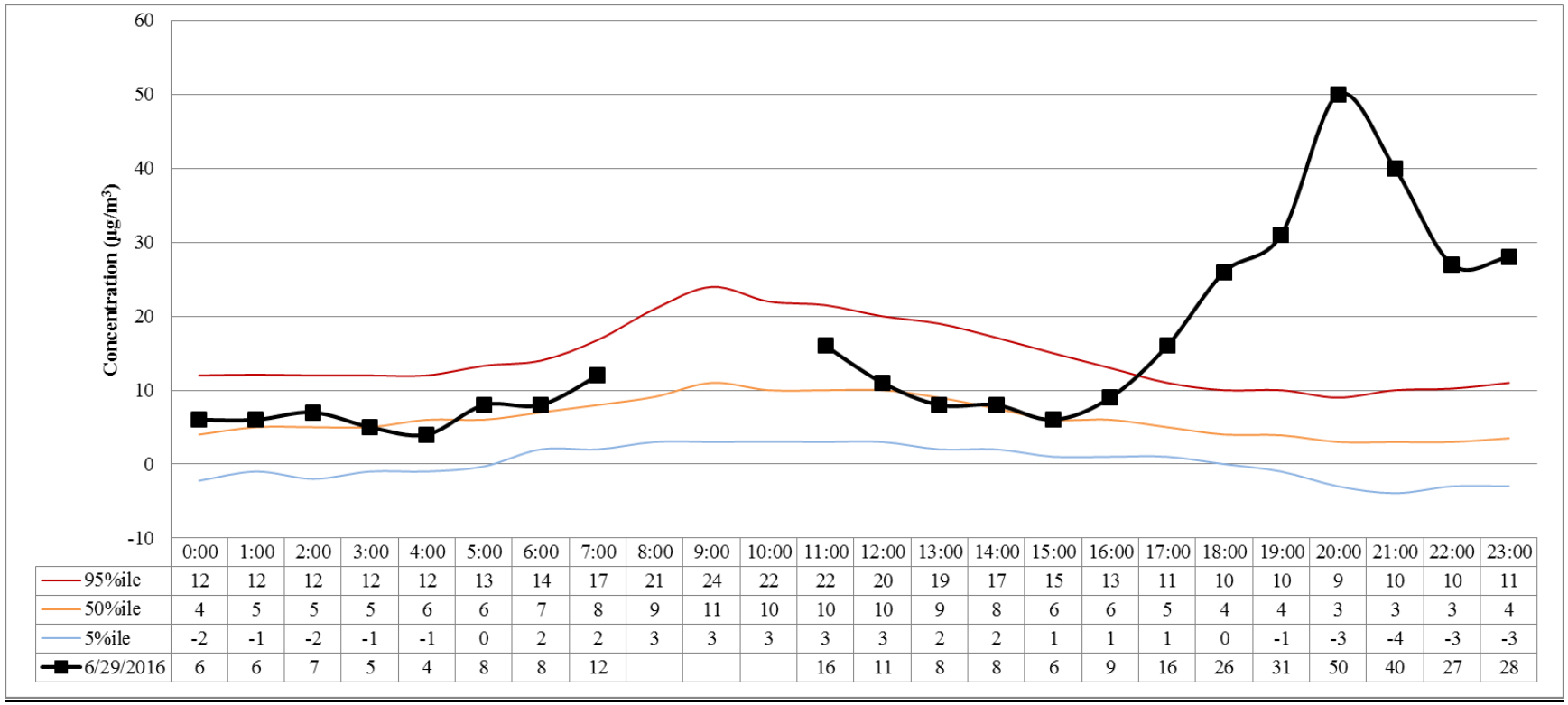
$PM_{2.5}$ concentrations during non-event days (June 28 and July 5, 2016) clearly show the $PM_{2.5}$ concentrations followed historical $PM_{2.5}$ diurnal patterns. This pattern is also consistent with hourly O_3 concentrations for the same non-event days. Smoke from the Trailhead Fire starts to affect the Truckee Meadows beginning the afternoon of June 29, 2016 as indicated by the increase in $PM_{2.5}$. Elevated $PM_{2.5}$ concentrations continued through the episode until July 5, when weather conditions change and reduce the amount of smoke transported to the Truckee Meadows. In this case, the increase in $PM_{2.5}$ concentrations corresponds with the increase in O_3 concentrations, peaking at the same time in the afternoon hours. This indicates that smoke from the Trailhead Fire increased $PM_{2.5}$ concentrations and O_3 precursors leading to the formation and increase in O_3 concentrations.

Figure 3.20: Percentiles for Hourly Seasonal $PM_{2.5}$ for 2011-2016 with June 28, 2016



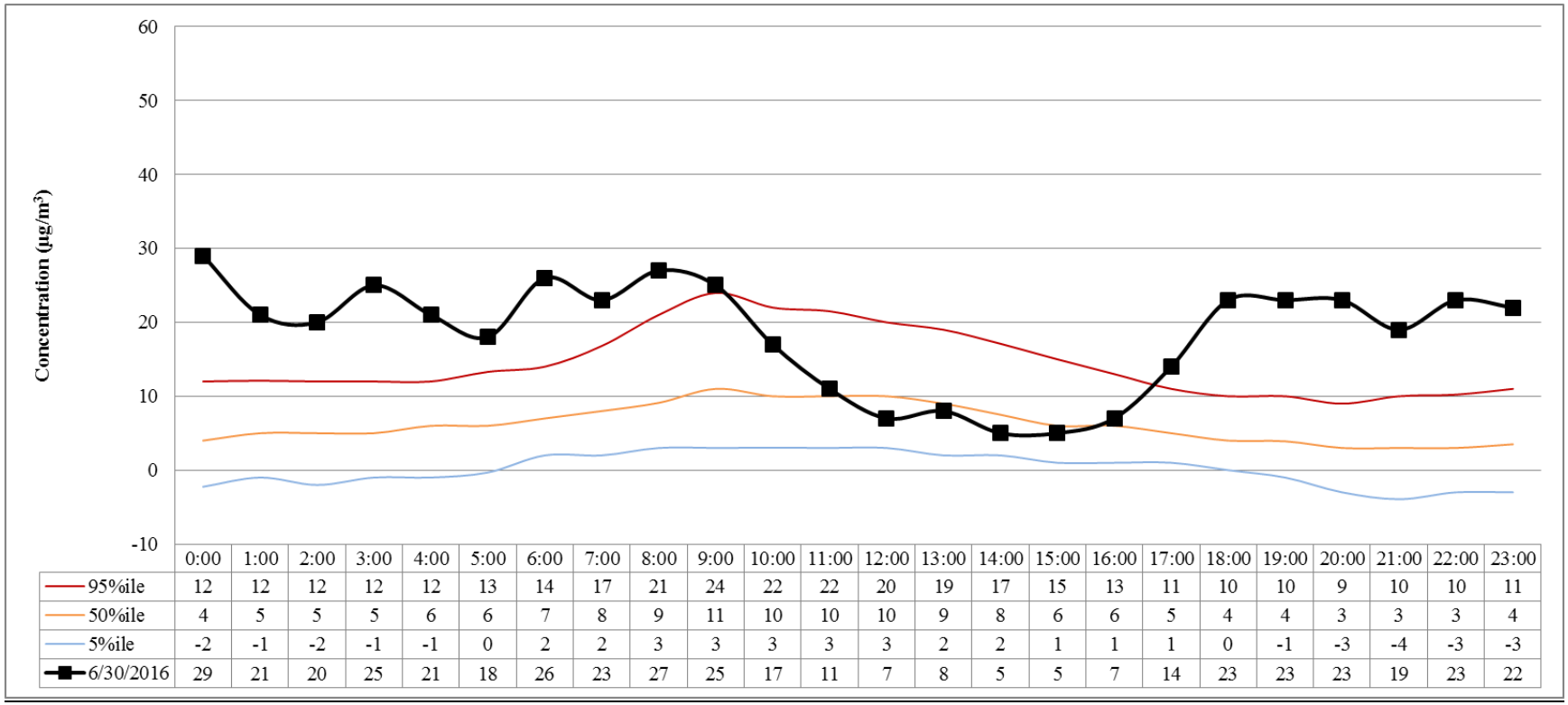
	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	12	12	12	12	12	13	14	17	21	24	22	22	20	19	17	15	13	11	10	10	9	10	10	11
50%ile	4	5	5	5	6	6	7	8	9	11	10	10	10	9	8	6	6	5	4	4	3	3	3	4
5%ile	-2	-1	-2	-1	-1	0	2	2	3	3	3	3	3	2	2	1	1	1	0	-1	-3	-4	-3	-3
6/28/2016	-1	3	6	7	8	9	6	5	7	17	16		7	3	0	1	3	3	1	4	5	4	4	5

Figure 3.21: Percentiles for Hourly Seasonal $PM_{2.5}$ for 2011-2016 with June 29, 2016



	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	12	12	12	12	12	13	14	17	21	24	22	22	20	19	17	15	13	11	10	10	9	10	10	11
50%ile	4	5	5	5	6	6	7	8	9	11	10	10	10	9	8	6	6	5	4	4	3	3	3	4
5%ile	-2	-1	-2	-1	-1	0	2	2	3	3	3	3	3	2	2	1	1	1	0	-1	-3	-4	-3	-3
6/29/2016	6	6	7	5	4	8	8	12				16	11	8	8	6	9	16	26	31	50	40	27	28

Figure 3.22: Percentiles for Hourly Seasonal $PM_{2.5}$ for 2011-2016 with June 30, 2016



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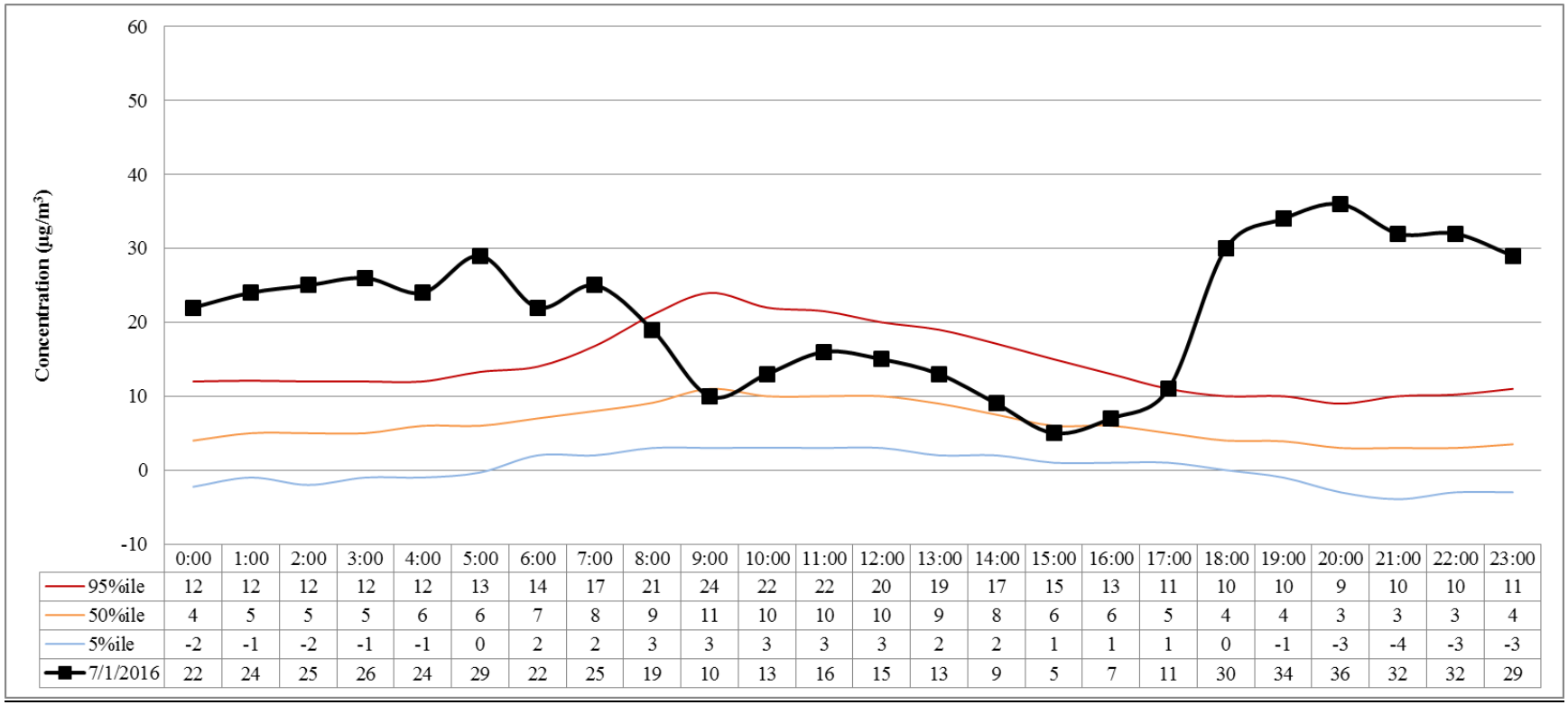
95%ile	12	12	12	12	12	13	14	17	21	24	22	22	20	19	17	15	13	11	10	10	9	10	10	11
50%ile	4	5	5	5	6	6	7	8	9	11	10	10	10	9	8	6	6	5	4	4	3	3	3	4
5%ile	-2	-1	-2	-1	-1	0	2	2	3	3	3	3	3	2	2	1	1	1	0	-1	-3	-4	-3	-3
6/30/2016	29	21	20	25	21	18	26	23	27	25	17	11	7	8	5	5	7	14	23	23	23	19	23	22

Figure 3.23: Percentiles for Hourly Seasonal $PM_{2.5}$ for 2011-2016 with July 1, 2016



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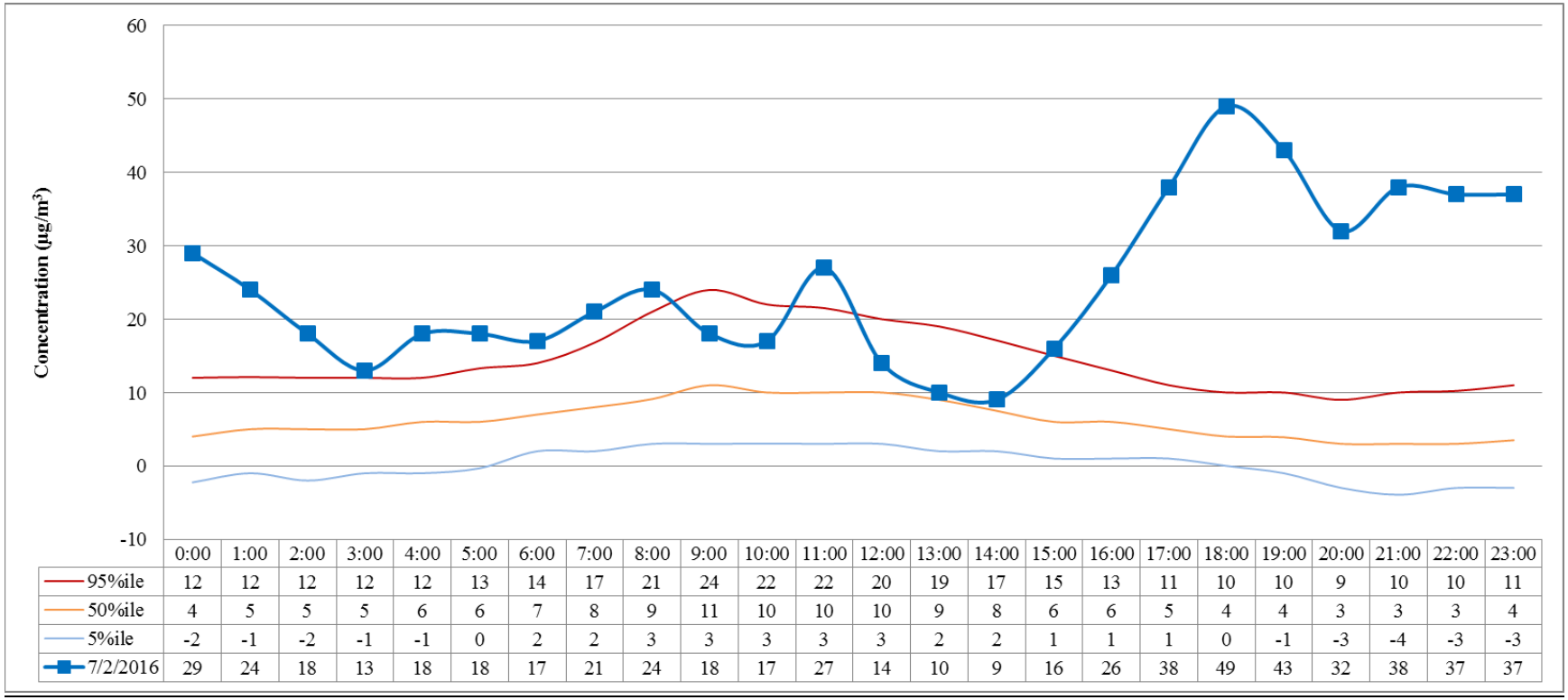
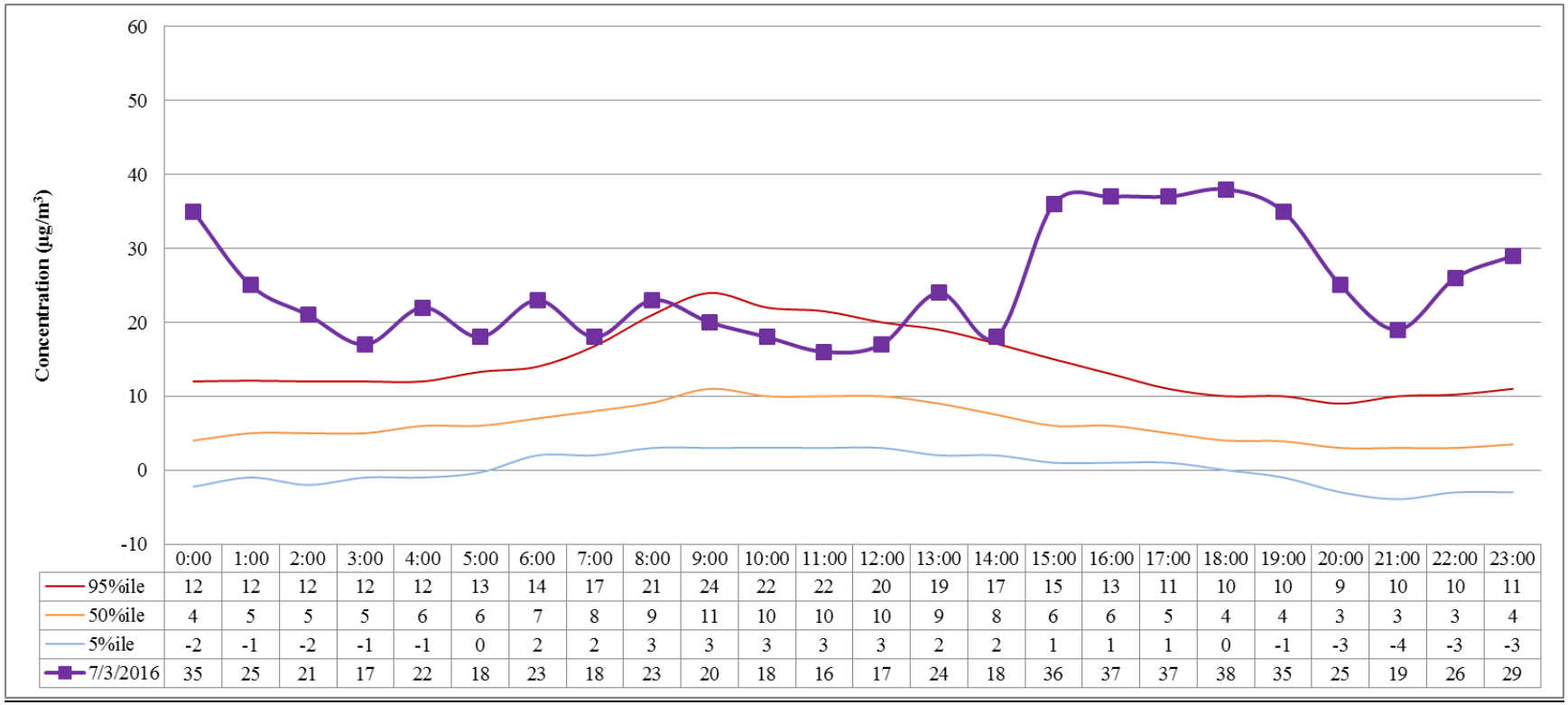
95%ile	12	12	12	12	12	13	14	17	21	24	22	22	20	19	17	15	13	11	10	10	9	10	10	11
50%ile	4	5	5	5	6	6	7	8	9	11	10	10	10	9	8	6	6	5	4	4	3	3	3	4
5%ile	-2	-1	-2	-1	-1	0	2	2	3	3	3	3	3	2	2	1	1	1	0	-1	-3	-4	-3	-3
7/1/2016	22	24	25	26	24	29	22	25	19	10	13	16	15	13	9	5	7	11	30	34	36	32	32	29

Figure 3.24: Percentiles for Hourly Seasonal $PM_{2.5}$ for 2011-2016 with July 2, 2016



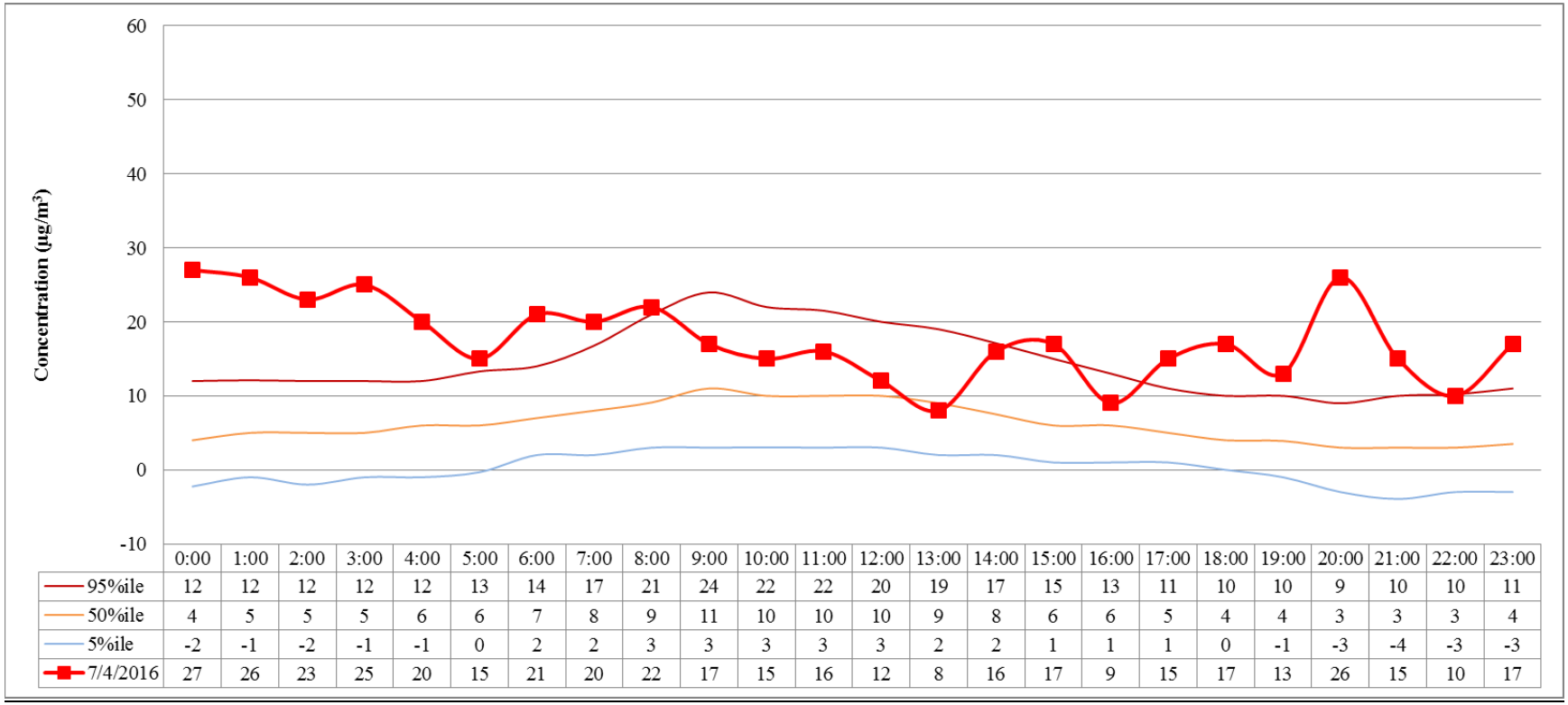
	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	12	12	12	12	12	13	14	17	21	24	22	22	20	19	17	15	13	11	10	10	9	10	10	11
50%ile	4	5	5	5	6	6	7	8	9	11	10	10	10	9	8	6	6	5	4	4	3	3	3	4
5%ile	-2	-1	-2	-1	-1	0	2	2	3	3	3	3	3	2	2	1	1	1	0	-1	-3	-4	-3	-3
7/2/2016	29	24	18	13	18	18	17	21	24	18	17	27	14	10	9	16	26	38	49	43	32	38	37	37

Figure 3.25: Percentiles for Hourly Seasonal $PM_{2.5}$ for 2011-2016 with July 3, 2016



	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	12	12	12	12	12	13	14	17	21	24	22	22	20	19	17	15	13	11	10	10	9	10	10	11
50%ile	4	5	5	5	6	6	7	8	9	11	10	10	10	9	8	6	6	5	4	4	3	3	3	4
5%ile	-2	-1	-2	-1	-1	0	2	2	3	3	3	3	3	2	2	1	1	1	0	-1	-3	-4	-3	-3
7/3/2016	35	25	21	17	22	18	23	18	23	20	18	16	17	24	18	36	37	37	38	35	25	19	26	29

Figure 3.26: Percentiles for Hourly Seasonal $PM_{2.5}$ for 2011-2016 with July 4, 2016



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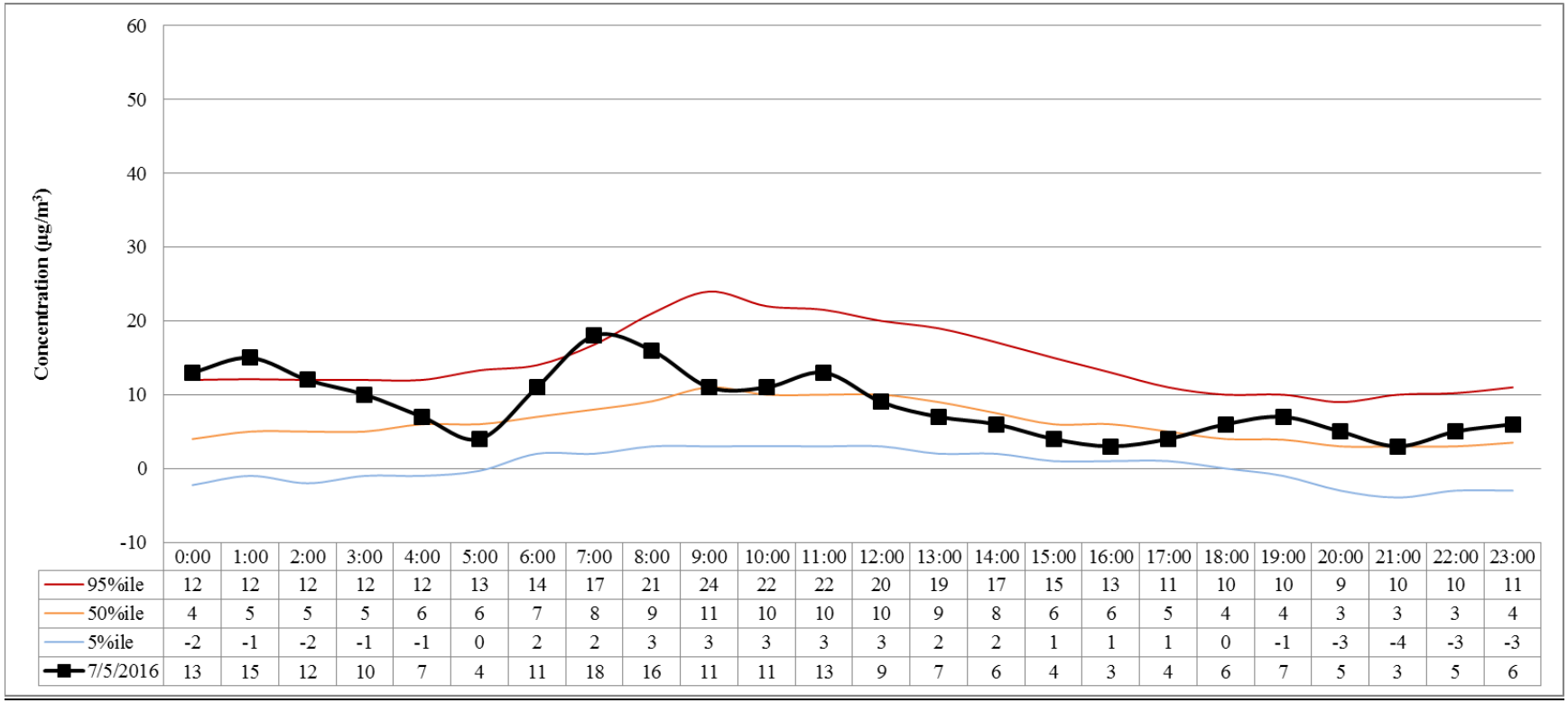
95%ile	12	12	12	12	12	13	14	17	21	24	22	22	20	19	17	15	13	11	10	10	9	10	10	11
50%ile	4	5	5	5	6	6	7	8	9	11	10	10	10	9	8	6	6	5	4	4	3	3	3	4
5%ile	-2	-1	-2	-1	-1	0	2	2	3	3	3	3	3	2	2	1	1	1	0	-1	-3	-4	-3	-3
7/4/2016	27	26	23	25	20	15	21	20	22	17	15	16	12	8	16	17	9	15	17	13	26	15	10	17

Figure 3.27: Percentiles for Hourly Seasonal $PM_{2.5}$ for 2011-2016 with July 5, 2016



	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
95%ile	12	12	12	12	12	13	14	17	21	24	22	22	20	19	17	15	13	11	10	10	9	10	10	11
50%ile	4	5	5	5	6	6	7	8	9	11	10	10	10	9	8	6	6	5	4	4	3	3	3	4
5%ile	-2	-1	-2	-1	-1	0	2	2	3	3	3	3	3	2	2	1	1	1	0	-1	-3	-4	-3	-3
7/5/2016	13	15	12	10	7	4	11	18	16	11	11	13	9	7	6	4	3	4	6	7	5	3	5	6

3.3.3 $PM_{2.5}$ Speciation Data

The Reno3 site has been part of EPA's $PM_{2.5}$ Speciation Trends Network since 2001. The monitor follows the same EPA sampling calendar as the $PM_{2.5}$ FRM providing direct comparison for wildfire events. $PM_{2.5}$ Speciation data was collected before (June 26), during (June 29, July 2 and 5), and after (July 8) the event.

Organic carbon (OC) can be emitted directly from combustion activities or produced from secondary processes such as gas-to-particle formation. Elemental carbon (EC), also known as light absorbing carbon or black carbon, is emitted directly from combustion sources. Increased summer background concentrations of OC in the western United States were regional by nature, likely due to the influence of biomass burning emissions. Conversely, summer background concentrations of EC due to impacts from biomass burning were higher in the urban areas.[3]

The historical (Jun-Aug, 2011-2015) median OC concentration is 1.61 µg/m^3. During the 2016 Trailhead Fire, the OC concentration recorded on July 2 (9.48 µg/m^3) was above the 98th percentile compared to historical concentrations that were not influenced by wildfire smoke.

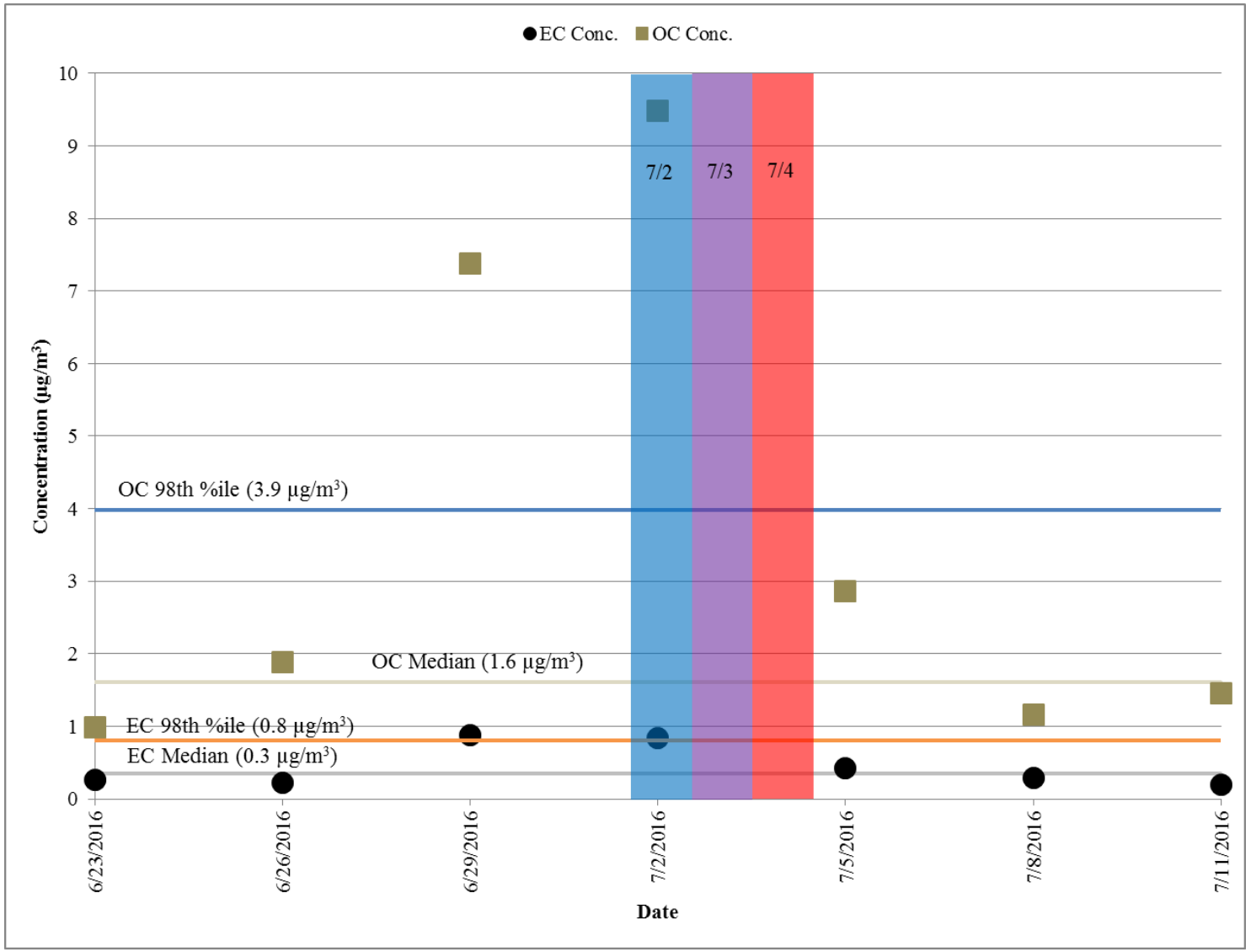
Likewise, EC concentrations were also elevated above the 98th percentile on July 2 (0.84 µg/m^3). This is in comparison to the historical median concentration of 0.35 µg/m^3. Figure 3.14 depicts June 23 through July 11, 2016 concentrations in comparison to historical OC and EC concentrations. Historical concentrations do not include data affected by wildfires in 2012, 2013, 2014, and 2015.

Table 3.2: 2011-2015 (Jun, Jul, and Aug) Elemental & Organic Carbon Concentrations

	Concentrations (µg/m^3)			
	Highest	Lowest	Median	Average
Elemental Carbon	1.16	0.09	0.35	0.37
Organic Carbon	4.53	0.13	1.61	1.66

[3] J. L. Hand, B. A. Schichtel, W. C. Malm, and N. H. Frank, "Spatial and Temporal Trends in $PM_{2.5}$ Organic and Elemental Carbon across the United States," Advances in Meteorology, vol. 2013, Article ID 367674, 13 pages, 2013. doi:10.1155/2013/367674.

Figure 3.28: Elemental & Organic Carbon Concentrations during the 2016 Trailhead Fire



3.3.4 $PM_{2.5}/PM_{10}$ Ratio

$PM_{2.5}$ concentrations in the Truckee Meadows typically peak during: 1) Wintertime temperature inversions when wood smoke is trapped in the valley, and 2) wildfire smoke episodes. During these conditions, $PM_{2.5}$ from combustion accounts for a higher fraction of the total particulates. Table 3.3 includes the 24-hour $PM_{2.5}$ and PM_{10} concentrations from the Reno3 monitoring station before, during, and after smoke from the Trailhead Fire impacted the Truckee Meadows.

Table 3.3: $PM_{2.5}/PM_{10}$ Ratio

Date	24 Hour Average (µg/m^3)		$PM_{2.5}/PM_{10}$
	$PM_{2.5}$	PM_{10}	
6/28	6.2	12.7	0.49
6/29	15.8	27.0	0.58
6/30	18.4	30.0	0.61
7/1	21.1	34.0	0.62
7/2	24.7	39.6	0.62
7/3	24.8	39.7	0.62
7/4	17.5	28.2	0.62
7/5	8.5	18.1	0.47

The increase in the $PM_{2.5}/PM_{10}$ ratio during the episode is additional evidence that smoke from the Trailhead Fire affected the Truckee Meadows, specifically the Reno3 PM monitors.

3.3.5 $PM_{2.5}$ and Carbon Monoxide Correlations

It has been documented that ambient $PM_{2.5}$ and CO concentrations are correlated in the presence of wildfire smoke and as presented at the EPA/WESTAR Exceptional Events Workshop in November 2016 in Denver, CO. $PM_{2.5}$ and CO at the Reno3 monitoring site were plotted for July 2, 3, and 4, 2016 and compared to a non-event day (Equation below).

Non-Event Slope (June 26, 2016)

$$y = -2.487x + 6.536 \qquad R^2 = 0.0002$$

Figure 3.29: Hourly Reno3 $PM_{2.5}$ and CO for July 2, 2016

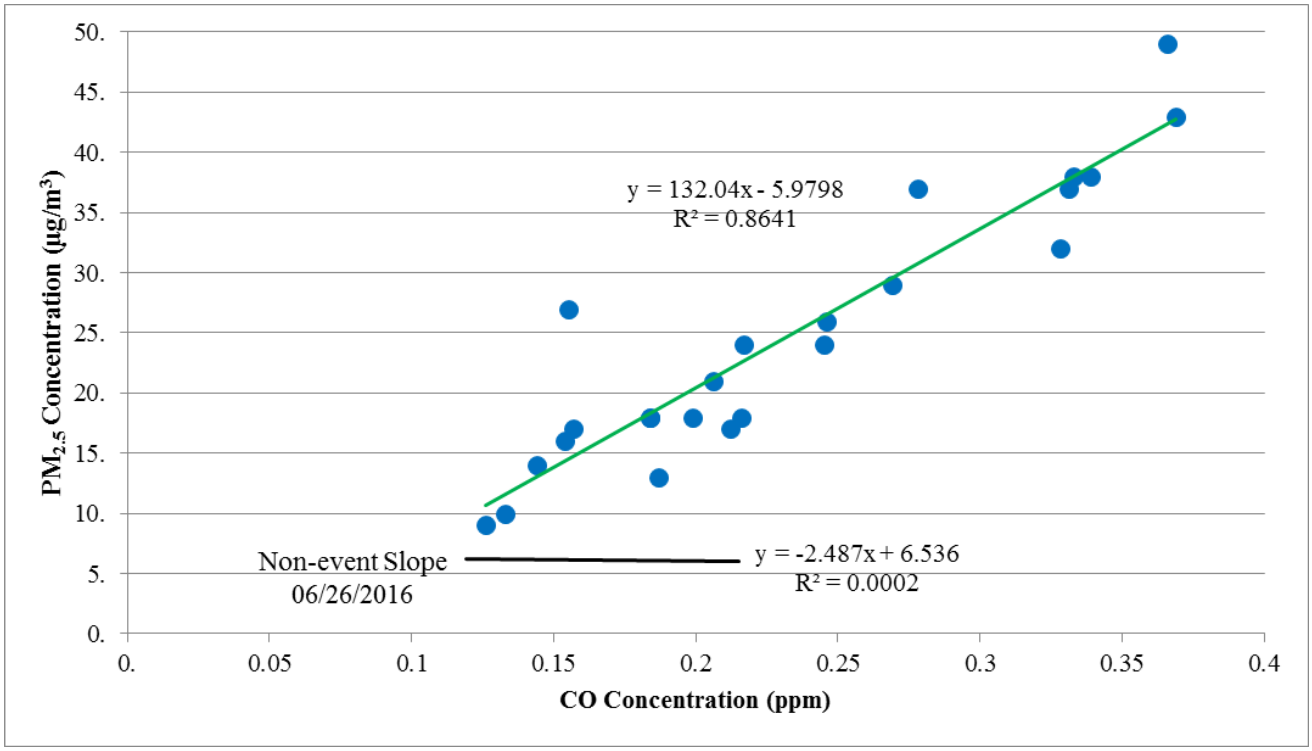


Figure 3.30: Hourly Reno3 $PM_{2.5}$ and CO for July 3, 2016

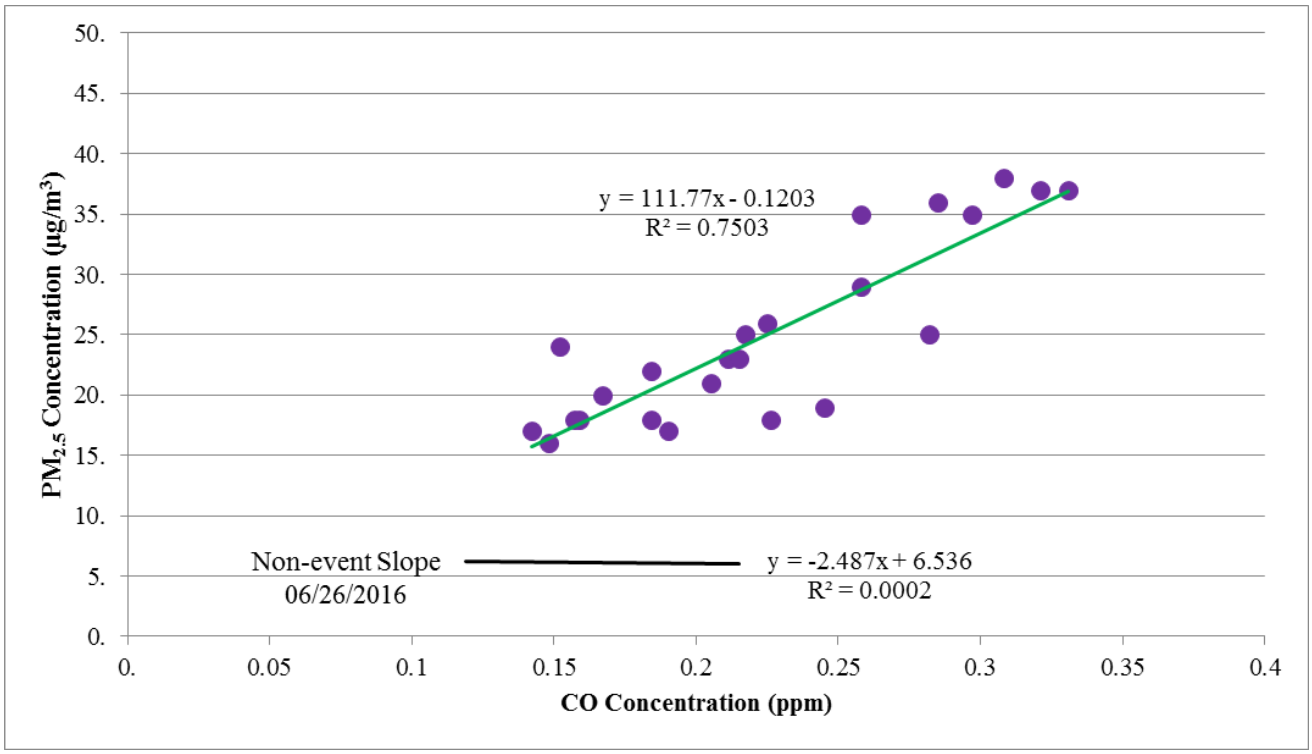
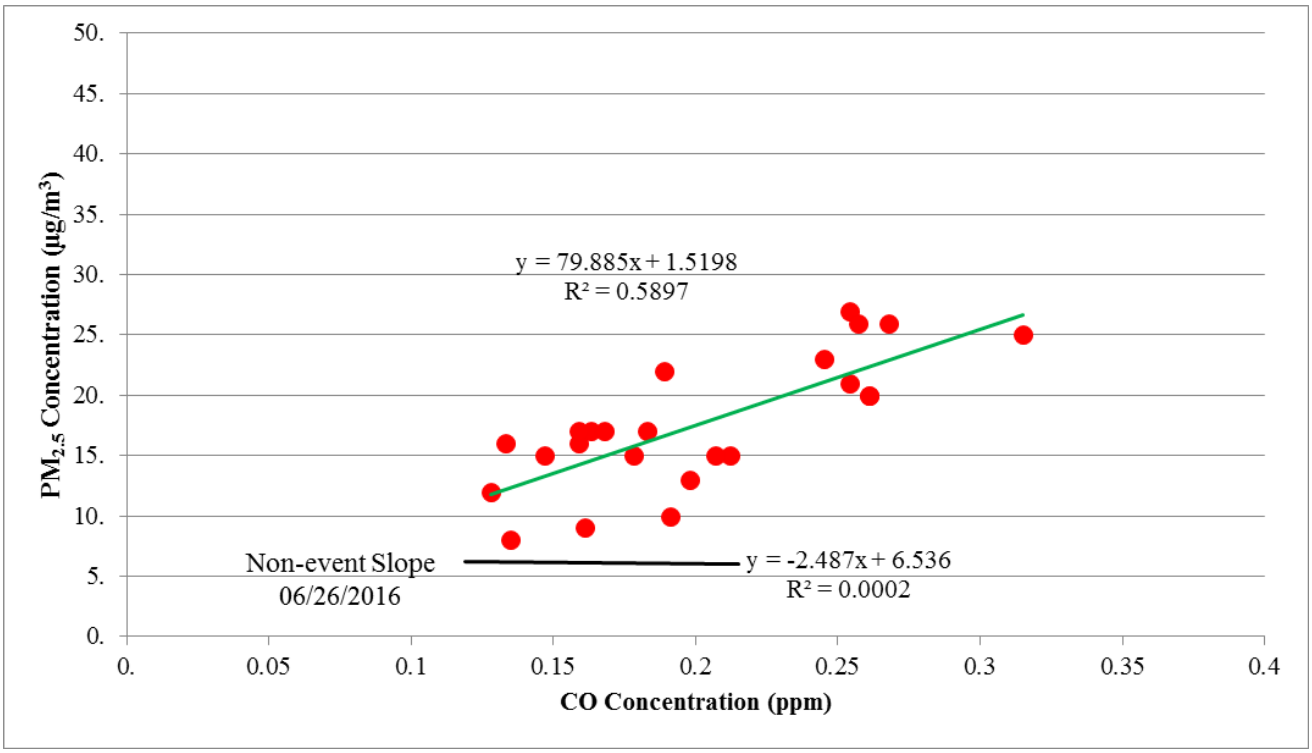


Figure 3.31: Hourly Reno3 $PM_{2.5}$ and CO for July 4, 2016



3.3.6 Area Forecast Discussions

The National Weather Service Forecast Office in Reno, Nevada provides at least two daily Area Forecast Discussions summarizing the short and long-term weather forecast. It also provides a synopsis of current observations as well as weather events such as smoke and haze. Below is an excerpt from an area forecast discussion issued during the Trailhead Fire. All area forecast discussions issued between June 28 and July 5, 2016 are included in Appendix G.

> *"Main change to the short term forecast was increasing the haze and smoke areas today and Sunday as the Trailhead fire west of the Sierra crest is likely to burn actively for at least the next couple of days. Winds will become more favorable for spreading smoke across the I-80 corridor into Reno-Sparks . . ."*
>
> Excerpt from NWS-Reno Area Forecast Discussion (251 AM PDT SAT JUL 2 2016)

3.3.7 Smoke Text Products

The NOAA, Satellite and Information Service, NESDIS provide twice daily national Satellite Smoke Text Products. These text products are primarily intended to describe significant areas of smoke associated with active fires and smoke which has become detached from the fires and drifted some distance away from the source fire, typically over the course of one or more days. Below is an excerpt from an NESDIS smoke text product issued during the Trailhead Fire. All smoke text products issued between June 28 and July 5, 2016 are included in Appendix H.

> *". . . Trailhead was emitting a light to heavy density smoke plume to the northeast."*
>
> Excerpt from NOAA Smoke Text Product
> (Saturday, July 02 2016)

3.4 Clear Causal Relationship Conclusion

In June and July, 2016, the Trailhead Fire burned 5,646 acres. Wildfire smoke, including O_3 precursors, from this fire was transported into the Truckee Meadows beginning on June 29. The Truckee Meadows, specifically the Reno3 monitor (AQS ID 32-031-0016), measured elevated concentrations of O_3, $PM_{2.5}$, NOx, CO, OC, and EC during the episode, including three exceedances of the O_3 NAAQS. The most critical parameters demonstrating wildfire smoke and O_3 (O_3, OC, and EC) were in the 98th percentile or above compared to historical concentrations (June-August, 2010-2015). Below is a summary of these critical parameters from the Reno3 station during the days recommended to be excluded (July 2, 3, and 4, 2016) from comparison to the O_3 NAAQS.

Parameter	Percentiles Compared to Historical Concentrations (Jun-Aug, 2010-2015)		
	7/2	7/3	7/4
O_3	99th	99th	99th
OC	98th	not regular sample days	
EC	98th	not regular sample days	

Hourly O_3 concentrations during this period were also unusually high compared to historical concentrations, further supporting the presence of wildfire smoke. Additional evidence of the exceptional event is documented with $PM_{2.5}$ to PM_{10} ratios, $PM_{2.5}$ to CO correlations, HYPSLIT backward trajectories, visible satellite imagery, HMS detected smoke layers, AirNow Tech images, Satellite Smoke Text products, NWS Area Forecast Discussions, and social media coverage.

The comparisons and statistical analyses provided in Section 3.0 of this demonstration support AQMD's demonstration that the wildfire event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedances on July 2, 3 and 4, 2016. Section 3.0 thus satisfies the clear causal relationship criterion as required by the EER and 40 CFR 50.14(c)(3)(iv).

4.0 NATURAL EVENT

Based on the documentation provided in Section 2.0 (Exceptional Event Summary), the Trailhead Fire qualifies as a "Natural Event" as defined in 40 CFR 50.1(k). Although the cause of the fire is still under investigation, ". . . wildfires on wildland initiated by accident or arson are considered natural events, and on a case-by-case basis this treatment for wildfires may bear on the appropriate treatment of accidental and arson-set structural fires."[4] Also, human activity plays little or no direct causal role on the event and its resulting emissions.

The event also meets the definitions of "Wildfire" predominantly occurring on "Wildland" as defined in 40 CFR 50.1(n) and (o). The Trailhead Fire predominantly occurred on federal and/or state owned lands.

[4] Final Rule "Treatment of Data Influenced by Exceptional Events"; Section IV.E.1.b, Footnote 35; 81 FR 68233 (October 3, 2016).

5.0 NOT REASONABLY CONTROLLABLE OR PREVENTABLE

Based on the documentation provided in Section 2.0 (Exceptional Event Summary), the Trailhead Fire was a natural event predominantly occurring on wildland in California. The AQMD is not aware of any evidence clearly demonstrating that prevention or control efforts beyond those actually made would have been reasonable. Therefore, emissions from the Trailhead Fire were not reasonably controllable or preventable.

6.0 CONCLUSION AND RECOMMENDATIONS

The Trailhead Fire ignited on Tuesday, June 28, 2016 along the middle fork of the American River Canyon, approximately 14 miles northeast of Auburn, California. Its cause remains under investigation. During the first 24 hours, the fire had grown to more than 1,000 acres. By Wednesday, June 29, wildfire smoke reached the Truckee Meadows 65 miles to the northeast. This resulted in several days of elevated O_3 and $PM_{2.5}$ concentrations, especially on July 2, 3, and 4, 2016. The 2016 Trailhead Fire EE Demonstration supports the criteria for an exceptional event detailed in the 2016 Exceptional Events Rule and Wildfire Ozone Guidance. Specifically, the documentation used the following evidence to demonstrate the exceptional event:

- ambient air monitoring data
- statistical analyses of the monitoring data compared to historical concentrations
- analyses of wildfire smoke emissions
- satellite imagery (visible and detected smoke)
- narratives from the National Oceanic and Atmospheric Administration and National Weather Service (Reno)
- HYSPLIT trajectory analyses
- social and traditional media posts

This EE Demonstration clearly demonstrates justification for exclusion of data for July 2, 3, and 4, 2016 due to an exceptional event under 40 CFR 50.14(c)(3)(iv). The 2016 Trailhead Fire EE Demonstration has provided evidence that:

1. Emissions from a wildfire event caused O_3 exceedances at the Reno3 monitor;
2. The event affected air quality in such a way that there exists a clear causal relationship between the event and the exceedances on July 2, 3, and 4, 2016;
3. Event-influenced concentrations were unusual and above normal historical concentrations;
4. The event was a wildfire and a natural event predominately occurring on wildland; and
5. The event was not reasonably controllable or preventable.

The AQMD recommends that EPA Region 9 concur with the 2016 Trailhead Fire EE Demonstration and exclude data from the Reno3 O_3 monitor for July 2, 3, and 4, 2016 from comparison to the NAAQS.

APPENDIX A

EPA 2016 ANNUAL NETWORK PLAN APPROVAL LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

OCT 26 2016

Mr. Daniel K. Inouye
Chief, Monitoring and Planning Branch
Air Quality Management Division
Washoe County Health District
P.O. Box 11130
Reno, Nevada 89520-0027

Dear Mr. Inouye:

Thank you for your submission of the Washoe County Health District Air Quality Management Division's (WCHD-AQMD's) 2016 Ambient Air Monitoring Network Plan in July 2016. We have reviewed the submitted document based on the requirements set forth under 40 CFR 58. Based on the information provided in the plan, the U.S. Environmental Protection Agency (EPA) approves all portions of the network plan except those specifically identified below.

Please note that we cannot approve portions of the annual network plan for which the information in the plan is insufficient to judge whether the requirement has been met, or for which the information, as described, does not meet the requirements as specified in 40 CFR 58.10 and the associated appendices. EPA Region 9 also cannot approve portions of the plan for which the EPA Administrator has not delegated approval authority to the regional offices. Accordingly, the first enclosure (*A. Annual Monitoring Network Plan Items where EPA is Not Taking Action*) provides a listing of specific items of your agency's annual monitoring network plan where EPA is not taking action. The second enclosure (*B. Additional Items Requiring Attention*) is a listing of additional items in the plan that EPA wishes to bring to your agency's attention.

The third enclosure (*C. Annual Monitoring Network Plan Checklist*) is the checklist EPA used to review your plan for overall items that are required to be included in the annual network plan along with our assessment of whether the plan submitted by your agency addresses those requirements.

The first two enclosures highlight a subset of the more extensive list of items reviewed in the third enclosure. All comments conveyed via this letter (and enclosures) should be addressed (through corrections within the plan, additional information being included, or discussion) in next year's annual monitoring network plan.

If you have any questions regarding this letter or the enclosed comments, please feel free to contact me at (415) 947-4134 or Anna Mebust at (415) 972-3265.

Sincerely,

Gwen Yoshimura, Acting Manager
Air Quality Analysis Office

Enclosures:

A. Annual Monitoring Network Plan Items where EPA is Not Taking Action
B. Additional Items Requiring Attention
C. Annual Monitoring Network Plan Checklist

cc (via email): Craig Petersen, WCHD-AQMD

A. Annual Monitoring Network Plan Items where EPA is Not Taking Action

We are not acting on the portions of annual network plans where either EPA Region 9 lacks the authority to approve specific items of the plan, or EPA has determined that a requirement is either not met or information in the plan is insufficient to judge whether the requirement has been met.

- Per 40 CFR 58.11(c), NCore, PAMS, and STN network design and changes are subject to approval of the EPA Administrator. Therefore, we are not acting on these items.

- System modifications (e.g., site closures or moves) are subject to approval per 40 CFR 58.14(c). Information provided in the plan was insufficient for EPA to approve the system modifications listed in the plan per the applicable requirement. Therefore, we are not acting on the following items as part of this year's annual network plan (see Checklist Row 3):

    - Discontinuation of CO monitoring at Lemmon Valley and Toll SLAMS
    - Shutdown of Plumb Kit SLAMS
    - Initiation of a new monitoring site at West Reno/Verdi

- EPA identified items in your agency's annual monitoring network plan where a requirement was not being met or information in the plan was insufficient to judge whether the requirement was being met based on 40 CFR 58.10 and the associated appendices. Therefore, we are not acting on the following items:

Item	Checklist Row	Issue
Identification of maximum concentration O_3 site(s)	54	Incorrect
NCore site and all required parameters operational	64	Insufficient to judge in one instance
Distance from supporting structure	81	Not meeting requirement in some instances

Additional information for each of these items may be found for the row listed in column 2, in the third enclosure (*C. Annual Monitoring Network Plan Checklist).*

B. Additional Items Requiring Attention

- [Item 37] Table D-4 in Appendix D of 40 CFR 58 indicates that the minimum number of PM_{10} monitoring sites is 1-2 for the population and maximum concentration provided in Table 5 of AQMD's plan. Table 5 of AQMD's plan lists the minimum number of sites required as 0. While AQMD is still meeting this requirement with 5 sites, please update the minimum number of required sites in next year's plan.
- [Item 58] In Table 6, AQMD lists one NO_2 monitor under "Required Area-Wide." According to 40 CFR 58 Appendix D 4.3.3., no monitor is required for CBSAs with populations below 1,000,000, as AQMD states in the text below Table 6. The monitor required at AQMD's NCore site is reflected in the text below the table. Please update the number of required monitors in the table to 0 in next year's plan.
- [Item 62] In Table 7, AQMD lists one SO_2 monitor under "Minimum Required." According to 40 CFR 58 Appendix D 4.4, no monitor is required for the PWEI calculated for the Reno CBSA, as AQMD states in the text below Table 7. The monitor required at AQMD's NCore site is reflected in the text below the table. Please update the number of required monitors to 0 in next year's plan.

C. ANNUAL MONITORING NETWORK PLAN CHECKLIST

(Updated February 10, 2016)

Year: 2016
Agency: Washoe County Health District Air Quality Management Division (WCHD - AQMD)

40 CFR 58.10(a)(1) requires that each Annual Network Plan (ANP) include information regarding the following types of monitors: SLAMS monitoring stations including FRM, FEM, and ARM monitors that are part of SLAMS, NCore stations, STN stations, State speciation stations, SPM stations, and/or, in serious, severe and extreme ozone nonattainment areas, and PAMS stations.

40 CFR 58.10(a)(1) further directs that, "The plan shall include a statement of purposes for each monitor and evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of this part, where applicable." On this basis, review of the ANPs is based on the requirements listed in 58.10 along with those in Appendices A, C, D, and E.

EPA Region 9 will not take action to approve or disapprove any item for which Part 58 grants approval authority to the Administrator rather than the Regional Administrators, but we will do a check to see if the required information is included and correct. The items requiring approval by the Administrator are: PAMS, NCore, and Speciation (STN/CSN).

Please note that this checklist summarizes many of the requirements of 40 CFR Part 58, but does not substitute for those requirements, nor do its contents provide a binding determination of compliance with those requirements. The checklist is subject to revision in the future and we welcome comments on its contents and structure.

Key:

White	meets the requirement
Yellow	requirement is not met, or information is insufficient to make a determination. Action requested in next year's plan or outside the ANP process (items listed in Enclosure A).
Green	item requires attention in order to improve next year's plan (items listed in Enclosure B).

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
GENERAL PLAN REQUIREMENTS					
1.	Submit plan by July 1st	58.10 (a)(1)	Yes	Yes	
2.	30-day public comment / inspection period[6]	58.10 (a)(1), 58.10 (a)(2)	Yes, page 1 and Appendix A	Yes	No comments received.
3.	Modifications to SLAMS network – case when we are not approving system modifications	58.10 (a)(2) 58.10 (b)(5) 58.10(e) 58.14	Yes, pages 10-11	Yes	AQMD indicated their intent to submit proposals to discontinue CO monitors at Lemmon Valley and Toll, discontinue all monitoring at Plumb Kit, and initiate a new site in West Reno/Verdi. In order for EPA to act on these modifications, AQMD must submit a formal proposal indicating whether the modifications meet the criteria provided in 40 CFR 58.14. AQMD also indicated that they intend to initiate monitoring at a new site in Spanish Springs in 2016. This proposal was previously approved by EPA. See Appendix B of AQMD's plan.
4.	Modifications to SLAMS network – case when we are approving system modifications per 58.14	58.10 (a)(2) 58.10 (b)(5) 58.10(e) 58.14	NA	NA	
5.	Does plan include documentation (e.g., attached approval letter) for system modifications that have been approved since last ANP approval?		NA	NA	No site modifications have been approved since the last ANP approval. AQMD included documentation for initiation of a new site at Spanish Springs, which was approved by EPA prior to the last ANP review

[1] Unless otherwise noted.
[2] Response options: NA (Not Applicable), Yes, No, Incomplete, Incorrect. The responses "Incomplete" and "Incorrect" assume that some information has been provided.
[3] To the best of our knowledge.
[4] Assuming the information is correct
[5] Response options: NA (Not Applicable) – [reason], Yes, No, Insufficient to Judge.
[6] The affected state or local agency must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
					and approval, and has not yet been completed. See Appendix B of AQMD's plan.
6.	Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal	58.10 (b)(5)	Yes, pages 10-11	Yes	See checklist item #3.
7.	A plan for establishing a near-road $PM_{2.5}$ monitor (in CBSAs $\geq$ 2.5 million) by 1/1/2015 **(plan was due July 1, 2014)**	58.10(a)(8)(i)	NA	NA	
8.	A plan for establishing a near-road $PM_{2.5}$ monitor (in CBSAs $\geq$ 1 million and $\leq$ 2.5 million) by 1/1/2017 **(plan due July 1, 2016)**	58.10(a)(8)(ii)	NA	NA	
9.	A plan for establishing a near-road CO monitor (in CBSAs $\geq$ 2.5 million) by 1/1/2015 **(plan was due July 1, 2014)**	58.10(a)(7) 58.13(e)(1)	NA	NA	
10.	A plan for establishing a near-road CO monitor (in CBSAs $\geq$ 1 million and $\leq$ 2.5 million) by 1/1/2017 **(plan due July 1, 2016)**	58.10(a)(7) 58.13(e)(1)	NA	NA	
11.	NO_2 plan for establishment of 2nd near-road monitor by 1/1/2015 **(plan was due July 1, 2014)**	58.10 (a)(5)(iv)	NA	NA	
12.	Precision/Accuracy reports submitted to AQS	58.16(a); App A, 1.3 and 5.1.1	Yes, page 11	Yes	
13.	Annual data certification submitted	58.15 App. A 1.3	Yes, page 11	Yes	
14.	Statement that SPMs operating an FRM/FEM/ARM that meet Appendix E also meet either Appendix A or an approved alternative. Documentation for any Appendix A approved alternative should be included.[7]	58.11 (a) (2)	NA	NA	No SPMs operating in 2015.
15.	SPMs operating FRM/FEM/ARM monitors for over 24 months are listed as comparable to the NAAQS or the agency provided documentation that	58.20(c)	NA	NA	No SPMs operating in 2015.

[7] Alternatives to the requirements of appendix A may be approved for an SPM site as part of the approval of the annual monitoring plan, or separately.

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
	requirements from Appendices A, C, or E were not met.[8]				
16.	For agencies that share monitoring responsibilities in an MSA/CSA: this agency meets full monitoring requirements or an agreement between the affected agencies and the EPA Regional Administrator is in place	App D 2(e)	NA	NA	
GENERAL PARTICULATE MONITORING REQUIREMENTS (PM_{10}, $PM_{2.5}$, Pb-TSP, Pb-PM_{10})					
17.	Designation of a primary monitor if there is more than one monitor for a pollutant at a site.	Need to determine collocation	Yes, Detailed Site Information	Yes	
18.	Distance between QA collocated monitors (Note: waiver request or the date of previous waiver approval must be included if the distance deviates from requirement.)	App. A 3.2.5.6 and 3.2.6.3	Yes, Detailed Site Information	Yes	
19.	For low volume PM instruments (flow rate < 200 liters/minute), all other PM instruments are > 1 m from the lovol. If no, list distance (meters) and instruments.	App E	Yes, Detailed Site Information	Yes	
20.	For high volume PM instruments (flow rate > 200 liters/minute), all other PM instruments are > 2m from the hivol. If no, list distance (meters) and instruments.	App E	NA	NA	None
$PM_{2.5}$ –SPECIFIC MONITORING REQUIREMENTS					
21.	Document how states and local agencies provide for the review of changes to a $PM_{2.5}$ monitoring network that impact the location of a violating $PM_{2.5}$ monitor.	58.10 (c)	NA	NA	
22.	Identification of any $PM_{2.5}$ FEMs and/or ARMs not eligible to be compared to the NAAQS due to poor comparability to FRM(s) [Note 1: must include	58.10 (b)(13) 58.11 (e)	NA	NA	

[8] This requirement only applies to monitors that are eligible for comparison to the NAAQS per 40 CFR §§58.11(e) and 58.30.

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
	required data assessment.] [Note 2: Required SLAMS must monitor $PM_{2.5}$ with NAAQS-comparable monitor at the required sample frequency.]				
23.	Minimum # of monitoring **sites** for $PM_{2.5}$ [Note 1: should be supported by MSA ID, MSA population, DV, # monitoring sites, and # required monitoring sites] [Note 2: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.]	App D, 4.7.1(a) and Table D-5	Yes, page 4	Yes	
24.	Requirements for continuous $PM_{2.5}$ monitoring (number of monitors and collocation)	App D 4.7.2	Yes, page 5	Yes	
25.	FRM/FEM/ARM $PM_{2.5}$ QA collocation	App A 3.2.5	Yes, page 8	Yes	
26.	$PM_{2.5}$ Chemical Speciation requirements for official STN sites	App D 4.7.4	Yes, page 26	Yes	
27.	Identification of sites suitable and sites not suitable for comparison to the annual $PM_{2.5}$ NAAQS as described in Part 58.30	58.10 (b)(7)	Yes, Detailed Site Information	Yes	
28.	Required $PM_{2.5}$ sites represent area-wide air quality	App D 4.7.1(b)	Yes, Detailed Site Information	Yes	
29.	For $PM_{2.5}$, within each MSA, at least one site at neighborhood or larger scale in an area of expected maximum concentration	App D 4.7.1(b)(1)	Yes, Detailed Site Information	Yes	Sparks is listed as the maximum $PM_{2.5}$ site.
30.	Minimum monitoring requirement for near-road $PM_{2.5}$ monitor (in CBSA $\geq$ 2.5 million) by 1/1/2015	58.13(f)(1) App D 4.7.1(b)(2)	NA	NA	
31.	If additional SLAMS $PM_{2.5}$ is required, there is a site in an area of poor air quality	App D 4.7.1(b)(3)	NA	NA	
32.	States must have at least one $PM_{2.5}$ regional background and one $PM_{2.5}$ regional transport site.	App D 4.7.3	NA	NA	This requirement is met by other agencies in the state.
33.	Sampling schedule for $PM_{2.5}$ - applies to year-round and seasonal sampling schedules (note: date of waiver approval must be included if the sampling season deviates from requirement)	58.10 (b)(4) 58.12(d) App D 4.7 EPA flowchart	Yes, Detailed Site Information	Yes	

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
34.	Frequency of flow rate verification for manual $PM_{2.5}$ monitors audit	App A 3.3.2	Yes, Detailed Site Information	Yes	
35.	Frequency of flow rate verification for automated $PM_{2.5}$ monitors audit	App A 3.2.3	Yes, Detailed Site Information	Yes	
36.	Dates of two semi-annual flow rate audits conducted in **CY2015** for $PM_{2.5}$ monitors	App A, 3.2.4 and 3.3.3	Yes, Detailed Site Information	Yes	
PM_{10} –SPECIFIC MONITORING REQUIREMENTS					
37.	Minimum # of monitoring sites for PM_{10} [Note: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.]	App D, 4.6 (a) and Table D-4	Yes, page 5	Yes	Table D-4 in Appendix D of 40 CFR 58 indicates that the minimum number of PM_{10} monitoring sites is 1-2 for the population and maximum concentration provided in Table 5 of AQMD's plan. Table 5 of AQMD's plan lists the minimum number of sites required as 0. While AQMD is still meeting this requirement with 5 sites, please update the minimum number of required sites in next year's plan.
38.	Manual PM_{10} method collocation (note: continuous PM_{10} does not have this requirement)	App A 3.3.1	NA	NA	The only manual PM_{10} monitor in the network is the QA-collocated $PM_{10-2.5}$ pair at Reno3.
39.	Sampling schedule for PM_{10}	58.10 (b)(4) 58.12(e) App D 4.6	Yes, Detailed Site Information	Yes	
40.	Frequency of flow rate verification for manual PM_{10} monitors audit	App A 3.3.2	Yes, Detailed Site Information	Yes	
41.	Frequency of flow rate verification for automated PM_{10} monitors audit	App A 3.2.3	Yes, Detailed Site Information	Yes	
42.	Dates of two semi-annual flow rate audits conducted in **CY2015** for PM_{10} monitors	App A, 3.2.4 and 3.3.3	Yes, Detailed Site Information	Yes	
Pb –SPECIFIC MONITORING REQUIREMENTS					
43.	Minimum # of monitors for non-NCore Pb [Note: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.]	App D 4.5 58.13(a)	Yes, page 7	Yes	None
44.	Pb collocation: for non-NCore sites	App A 3.3.4.3	NA	NA	
45.	Any source-oriented Pb site for which a waiver has been granted by EPA Regional Administrator	58.10 (b)(10)	NA	NA	

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
46.	Any Pb monitor for which a waiver has been requested or granted by EPA Regional Administrator for use of Pb-PM_{10} in lieu of Pb-TSP	58.10 (b)(11)	NA	NA	
47.	Designation of any Pb monitors as either source-oriented or non-source-oriented	58.10 (b)(9)	NA	NA	
48.	Sampling schedule for Pb	58.10 (b)(4) 58.12(b) App D 4.5	NA	NA	
49.	Frequency of flow rate verification for Pb monitors audit	App A 3.3.4.1	NA	NA	
50.	Dates of two semi-annual flow rate audits conducted in **CY2015** for Pb monitors	App A 3.3.4.1	NA	NA	
GENERAL GASEOUS MONITORING REQUIREMENTS					
51.	Frequency of one-point QC check (gaseous)	App. A 3.2.1	Yes, Detailed Site Information	Yes	
52.	Date of Annual Performance Evaluation (gaseous) conducted in **CY2015**	App. A 3.2.2	Yes, Detailed Site Information	Yes	
O_3 –SPECIFIC MONITORING REQUIREMENTS					
53.	Minimum # of monitoring sites for O_3 [Note 1: should be supported by MSA ID, MSA population, DV, # monitoring sites, and # required monitoring sites] [Note 2: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.] [Note 3: monitors that do not meet traffic count/distance requirements to be neighborhood or urban scale (40 CFR Appendix E, Table E-1) cannot be counted towards meeting minimum monitoring requirements]	App D, 4.1(a) and Table D-2	Yes, p.4	Yes	
54.	Identification of maximum concentration O_3 site(s)	App D 4.1 (b)	Yes	No	Sparks is listed as the maximum concentration site for O_3. However, the maximum O_3 concentration is at Reno3, which is also listed as the design value site for O_3 in Table 4.
55.	Sampling season for O_3 (Note: Waivers must be renewed annually. EPA expects agencies to submit	58.10 (b)(4) App D, 4.1(i)	Yes, Detailed Site Information	Yes	

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
	re-evaluations of the relevant data each year with the ANP. EPA will then respond as part of the ANP response.)				
NO_2 –SPECIFIC MONITORING REQUIREMENTS					
56.	Minimum monitoring requirement for single near-road NO_2 monitor (in CBSA ≥ 1 million) by 1/1/2014Note: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.]	58.13(c)(3) App D 4.3.2	Yes, p.5	Yes	None required
57.	Minimum monitoring requirement for second near-road NO_2 monitor (in CBSA ≥ 2.5 million) by 1/1/2015 [9] [Note: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.]	58.13(c)(4) App D 4.3.2	Yes, p.5	Yes	None required
58.	Minimum monitoring requirements for area-wide NO_2 monitor in location of expected highest NO_2 concentrations representing neighborhood or larger scale (operation required by January 1, 2013) [9]	App D 4.3.3	Yes, p.5	Yes	None required. In Table 6, AQMD lists one NO_2 monitor under "Required Area-Wide." According to 40 CFR 58 Appendix D 4.3.3, no monitor is required for CBSAs with populations below 1,000,000, as AQMD states in the text below Table 6. The monitor required at AQMD's NCore site is reflected in the text below the table. Please update the number of required monitors in the table to 0 in next year's plan.
59.	Minimum monitoring requirements for susceptible and vulnerable populations monitoring (aka RA40) NO_2 (operation required by January 1, 2013) [9]	App D 4.3.4	NA	NA	
60.	Identification of required NO_2 monitors as either near-road, area-wide, or vulnerable and susceptible population (aka RA40)	58.10 (b)(12)	NA	NA	
CO –SPECIFIC MONITORING REQUIREMENTS					
61.	Minimum monitoring requirement for near-road CO monitor (in CBSA ≥ 2.5 million) by 1/1/2015 [9]	58.13(e)(1) App D 4.2.1	Yes, p.6	Yes	None required
SO_2 –SPECIFIC MONITORING REQUIREMENTS					

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
62.	Minimum monitoring requirements for SO_2 based on PWEI and/or RA required monitors under Appendix D 4.4.3 [Note: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.]	App D 4.4	Yes, p.6	Yes	None required. In Table 7, AQMD lists one SO_2 monitor under "Minimum Required." According to 40 CFR 58 Appendix D 4.4, no monitor is required for the PWEI calculated for the Reno CBSA, as AQMD states in the text below Table 7. The monitor required at AQMD's NCore site is reflected in the text below the table. Please update the number of required monitors to 0 in next year's plan.
63.	Monitors used to meet Data Requirements Rule included in July 1, 2016 ANP (to be installed no later than January 1, 2017).	40 CFR 51.1203(c)	NA	NA	None required.
NCORE –SPECIFIC MONITORING REQUIREMENTS					
64.	NCore site and all required parameters operational: year-round O_3, trace SO_2, trace CO, NO_y, NO, $PM_{2.5}$ mass, $PM_{2.5}$ continuous, $PM_{2.5}$ speciation, $PM_{10-2.5}$ mass, resultant wind speed at 10m, resultant wind direction at 10m, ambient temperature, relative humidity, and Pb at CBSAs ≥ 500,000.	58.10 (a)(3); Pb collocation App. A 3.3.4.3; $PM_{10-2.5}$ minimum monitoring App. D 4.8; $PM_{10-2.5}$ sampling schedule 58.10 (b)(4) 58.12(f) App D 4.8; $PM_{10-2.5}$ collocation App. A 3.3.6	Yes, p. 26-29	Insufficient to judge	40 CFR 58 App D 3(b) includes NO/NO_y among the list of pollutants that must be measured at NCore sites. AQMD includes trace NO_y and NO_2 monitors in their detailed site tables, but does not include details on NO measurement. AQMD is not required to monitor for Pb at their NCore site since the CBSA population is <500,000.
SITE OR MONITOR - SPECIFIC REQUIREMENTS (OFTEN INCLUDED IN DETAILED SITE INFORMATION TABLES)					
65.	AQS site identification number for each site	58.10 (b)(1)	Yes, Detailed Site Information	Yes	
66.	Location of each site: street address and geographic coordinates	58.10 (b)(2)	Yes, Detailed Site Information	Yes	

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
67.	MSA, CBSA, CSA or other area represented by the monitor	58.10 (b)(8)	Yes, Detailed Site Information	Yes	
68.	Parameter occurrence code for each monitor	Needed to determine if other requirements (e.g., min # and collocation) are met	Yes, Detailed Site Information	Yes	
69.	Statement of purpose for each monitor	58.10 (a)(1)	Yes, Detailed Site Information	Yes	
70.	Basic monitoring objective for each monitor	App D 1.1 58.10 (b)(6)	Yes, Detailed Site Information	Yes	
71.	Site type for each monitor	App D 1.1.1	Yes, Detailed Site Information	Yes	
72.	Monitor type for each monitor, and Network Affiliation(s) as appropriate	Needed to determine if other requirements (e.g., min # and collocation) are met	Yes, Detailed Site Information	Yes	
73.	Scale of representativeness for each monitor as defined in Appendix D	58.10(b)(6); App D	Yes, Detailed Site Information	Yes	
74.	Parameter code for each monitor	Needed to determine if other requirements (e.g., min # and collocation) are met	Yes, Detailed Site Information	Yes	
75.	Method code and description (e.g., manufacturer & model) for each monitor	58.10 (b)(3); App C 2.4.1.2	Yes, Detailed Site Information	Yes	

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
76.	Sampling start date for each monitor	Needed to determine if other requirements (e.g., min # and collocation) are met	Yes, Detailed Site Information	Yes	
77.	Distance of monitor from nearest road	App E 6	Yes, Detailed Site Information	Yes	
78.	Traffic count of nearest road	App E	Yes, Detailed Site Information	Yes	
79.	Groundcover	App E 3(a)	Yes, Detailed Site Information	Yes	
80.	Probe height	App E 2	Yes, Detailed Site Information	Yes	
81.	Distance from supporting structure	App E 2	Yes, Detailed Site Information	No	PM instruments at all sites should be greater than 2m from any supporting structure.
82.	Distance from obstructions on roof (horizontal distance to the obstruction and vertical height of the obstruction above the probe should be provided)	App E 4(b)	Yes, Detailed Site Information	Yes	
83.	Distance from obstructions not on roof (horizontal distance to the obstruction and vertical height of the obstruction above the probe should be provided)	App E 4(a)	Yes, Detailed Site Information	Yes	
84.	Distance from the drip line of closest tree(s)	App E 5	Yes, Detailed Site Information	Yes	For monitors <10m from drip line of closest trees, the ANP explains "Trees are not of sufficient height and leaf canopy density to interfere with the normal unrestricted airflow or pollutant scavenging around the monitoring path. At least 90 percent of the monitoring path is at least 10 meters from the drip line of the trees."
85.	Distance to furnace or incinerator flue	App E 3(b)	Yes, Detailed Site Information	Yes	
86.	Unrestricted airflow (expressed as degrees around probe/inlet or percentage of monitoring path)	App E, 4(a) and 4(b)	Yes, Detailed Site Information	Yes	

	ANP requirement	Citation within 40 CFR 58[1]	Was the information submitted?[2] If yes, page #s. Flag if incorrect[3]?	Does the information provided[4] meet the requirement?[5]	Notes
87.	Probe material ($NO/NO_2/NO_y$, SO_2, O_3; For PAMS: VOCs, Carbonyls)	App E 9	Yes, Detailed Site Information	Yes	
88.	Residence time ($NO/NO_2/NO_y$, SO_2, O_3; For PAMS: VOCs, Carbonyls)	App E 9	Yes, Detailed Site Information	Yes	

Public Comments on Annual Network Plan
Were comments submitted to the S/L/T agency during the public comment period?

No

If no, skip the remaining questions.
If yes:

- Were any of the comments substantive?
  - If yes, which ones?
  - Explain basis for determination if any comments were considered not substantive:
- Did the agency respond to the substantive comments?
  - If yes, was the response adequate?
- Do the substantive comments require separate EPA response (i.e., agency response wasn't adequate)?
- Are the sections of the annual network plan that received substantive comments approvable after consideration of comments?
  - If yes, provide rationale:

APPENDIX B

2016 DATA CERTIFICATION LETTER

WASHOE COUNTY
HEALTH DISTRICT
ENHANCING QUALITY OF LIFE

February 17, 2017

Elizabeth Adams
Acting Air Division Director
U.S. EPA Region 9
75 Hawthorne Street, AIR-1
San Francisco, CA 94105

Re: CY2016 Ambient Air Monitoring Data Certification

Dear Ms. Adams:

Attached please find a copy of the Washoe County Health District, Air Quality Management Division's (AQMD) AQS AMP600 Data Certification Report for ambient air monitoring data for all State and Local Air Monitoring Stations (SLAMS) and Special Purpose Monitors (SPMs) which meet criteria in 40 CFR 58 Appendix A operated from January 1 to December 31, 2016. Included is data from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors for CO, $NO/NO_x/NO_2$, ozone, PM_{10}, $PM_{10-2.5}$, $PM_{2.5}$, and SO_2 (hourly and 5-minute average data).

This letter certifies that the ambient concentration data and the quality assurance data are completely submitted to AQS, and the ambient data are accurate to the best of my knowledge taking into consideration the quality assurance findings.

Please contact me or Craig Petersen at (775) 784-7200 with any questions or concerns.

Sincerely,

Daniel Inouye

Daniel Inouye
Branch Chief, Monitoring and Planning

Attachments

cc: Michael Flagg, Air Quality Analysis Office, U.S. EPA, Region 9
Fletcher Clover, Air Quality Analysis Office, U.S. EPA, Region 9
Charlene Albee, Director, AQMD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: BAA

CERTIFICATION EVALUATION AND CONCURRENCE

Report Request ID: 1519914

Report Code: AMP600

Feb. 6, 2017

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	32	031									

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
CRITERIA			

AGENCY SELECTIONS

Washoe County District Health Department

SELECTED OPTIONS

Option Type	Option Value
MERGE PDF FILES	YES
AGENCY ROLE	CERTIFYING

DATE CRITERIA

Start Date	End Date
2016	2016

Data Evaluation and Concurrence Report Summary

Feb. 6, 2017

Certification Year: 2016
Certifying Agency (CA): Washoe County District Health Department (1138)

Pollutants in Report:

Parameter Name	Code	Monitors Evaluated	Monitors Recommended for Concurrence by AQS	Monitors NOT Recommended for Concurrence by AQS
Carbon monoxide	42101	4	4	0
Nitrogen dioxide (NO2)	42602	1	1	0
Ozone	44201	6	6	0
PM10 Total 0-10um STP	81102	6	6	0
PM2.5 - Local Conditions	88101	3	3	0
Sulfur dioxide	42401	1	1	0

PQAOs in Report:

PQAO Name	PQAO Code	TSA Date
Washoe County District Health Department	1138	09/16/10

Summary of 'N' flags for all pollutants:

PQAO	Parameter Code	AQS Site-ID	POC	AQS Recommended Flag	Cert. Agency Recommended Flag	Reason for AQS Recommendation

Signature of Monitoring Organization Representative: Daniel Inouye

Data Evaluation and Concurrence Report for Gaseous Pollutants

Certifying Year 2016
Certifying Agency Code Washoe County District Health Department (1138)
Parameter Carbon monoxide (42101) (ppm)
PQAO Name Washoe County District Health Department (1138)
QAPP Approval Date 02/12/2013

NPAP Audit Summary:

Number of Passed Audits	NPAP Bias	Criteria Met
		Y

			Routine Data						One Point Quality Check			Annual PE		NPAP			Concur. Flag		
AQS Site ID	POC	Monitor Type	Mean	Min	Max	Exceed. Count	Outlier Count	Perc. Comp.	Precision	Bias	Complete	Bias	Complete	Bias	PQAO Level Criteria	QAPP Appr.	Aqs Rec Flag	CA Rec Flag	Epa Concur
32-031-0016	1	SLAMS	0.247	0.017	1.994	0	0	95	4.34	+4.34	100	8.53	100		Y	Y	Y		
32-031-0025	1	SLAMS	0.156	0.000	2.400	0	0	99	0.69	+/-0.83	100	2.98	100		Y	Y	Y		
32-031-1005	1	SLAMS	0.378	0.000	2.700	0	0	100	1.89	+/-1.44	100	3.05	100		Y	Y	Y		
32-031-2009	1	SLAMS	0.187	0.000	1.600	0	0	99	0.59	+1.01	100	3.44	100		Y	Y	Y		

Data Evaluation and Concurrence Report for Gaseous Pollutants

Certifying Year 2016
Certifying Agency Code Washoe County District Health Department (1138)
Parameter Nitrogen dioxide (NO2) (42602) (ppb)
PQAO Name Washoe County District Health Department (1138)
QAPP Approval Date 02/12/2013

NPAP Audit Summary:

Number of Passed Audits	NPAP Bias	Criteria Met
		Y

			Routine Data						One Point Quality Check			Annual PE		NPAP			Concur. Flag		
AQS Site ID	POC	Monitor Type	Mean	Min	Max	Exceed. Count	Outlier Count	Perc. Comp.	Precision	Bias	Complete	Bias	Complete	Bias	PQAO Level Criteria	QAPP Appr.	Aqs Rec Flag	CA Rec Flag	Epa Concur
32-031-0016	1	SLAMS	12.7	0.9	50.3		0	97	2.66	+/-2.29	100	6.84	100		Y	Y	Y		

Data Evaluation and Concurrence Report for Gaseous Pollutants

Certifying Year 2016
Certifying Agency Code Washoe County District Health Department (1138)
Parameter Ozone (44201) (ppm)
PQAO Name Washoe County District Health Department (1138)
QAPP Approval Date 02/12/2013

NPAP Audit Summary:

Number of Passed Audits	NPAP Bias	Criteria Met
2	1.55567	Y

			Routine Data						One Point Quality Check			Annual PE		NPAP			Concur. Flag		
AQS Site ID	POC	Monitor Type	Mean	Min	Max	Exceed. Count	Outlier Count	Perc. Comp.	Precision	Bias	Complete	Bias	Complete	Bias	PQAO Level Criteria	QAPP Appr.	Aqs Rec Flag	CA Rec Flag	Epa Concur
32-031-0016	1	SLAMS	0.050	0.005	0.090	0	0	98	2.74	+/-2.72	100	1.97	100		Y	Y	Y		
32-031-0020	1	SLAMS	0.049	0.013	0.082	0	0	99	2.47	+/-1.96	100	5.32	100	2.31	Y	Y	Y		
32-031-0025	1	SLAMS	0.048	0.013	0.073	0	0	99	1.14	+/-1.06	100	- 0.09	100	0.80	Y	Y	Y		
32-031-1005	1	SLAMS	0.048	0.009	0.080	0	0	100	1.50	+/-1.23	100	- 0.16	100		Y	Y	Y		
32-031-2002	1	SLAMS	0.048	0.029	0.071	0	0	99	3.78	+3.55	100	- 1.33	100		Y	Y	Y		
32-031-2009	1	SLAMS	0.050	0.021	0.079	0	0	99	1.07	+/-0.84	100	- 0.23	100		Y	Y	Y		

Data Evaluation and Concurrence Report for Gaseous Pollutants

Certifying Year 2016
Certifying Agency Code Washoe County District Health Department (1138)
Parameter Sulfur dioxide (42401) (ppb)

PQAO Name Washoe County District Health Department (1138)
QAPP Approval Date 02/12/2013

NPAP Audit Summary:

Number of Passed Audits	NPAP Bias	Criteria Met
		Y

			Routine Data						One Point Quality Check			Annual PE		NPAP			Concur. Flag		
AQS Site ID	POC	Monitor Type	Mean	Min	Max	Exceed. Count	Outlier Count	Perc. Comp.	Precision	Bias	Complete	Bias	Complete	Bias	PQAO Level Criteria	QAPP Appr.	Aqs Rec Flag	CA Rec Flag	Epa Concur
32-031-0016	1	SLAMS	0.2	- 0.2	5.6		0	93	4.39	-4.00	100	- 2.92	100		Y	Y	Y		

Data Evaluation and Concurrence Report for Particulate Matter

Certifying Year: 2016
Certifying Agency: Washoe County District Health Department (1138)

Parameter: PM10 Total 0-10um STP (81102) CONTINUOUS
PQAO Name: Washoe County District Health Department (1138)
Quality Assurance Project Plan Approval Date: 02/12/2013

Monitors Summaries

			Routine Data (ug/m3)						Flow Rate Verification		Flow Rate Audit			Collocation / Concurrence Flag		
AQS Site ID	POC	Monitor Type	Mean	Min	Max	Exceed. Count	Outlier Count	% Complete	Bias	% Complete	Bias	% Complete	QAPP Appr.	AQS Rec Flag	CA Rec Flag	EPA Concur
32-031-0016	2	SLAMS	18.44	-5.0	499.0		0	98	-1.24	100	+0.11	100	Y	Y		
32-031-0020	2	SLAMS	16.23	-5.0	268.0		0	99	-0.82	100	-0.78	100	Y	Y		
32-031-0025	2	SLAMS	15.00	-5.0	467.0		0	99	+/-0.81	100	-1.00	100	Y	Y		
32-031-0030	2	SLAMS	21.16	-5.0	574.0		0	99	+/-0.69	100	+0.25	100	Y	Y		
32-031-1005	4	SLAMS	20.25	-3.0	237.0		0	98	+/-1.10	100	+0.15	100	Y	Y		

Parameter: PM10 Total 0-10um STP (81102) INTERMITTENT
PQAO Name: Washoe County District Health Department (1138)
Quality Assurance Project Plan Approval Date: 02/12/2013

Collocation Summary

# Sites	# Sites Req	# Sites Collocated	% Collocated	CV Est	CV UB	Criteria Met?
0	0	0	100			Y

Monitors Summaries

			Routine Data (ug/m3)						Flow Rate Audit		Collocation			QAPP	Concurrence Flag		
AQS Site ID	POC	Monitor Type	Mean	Min	Max	Exceed. Count	Outlier Count	% Complete	Bias	% Complete	CV	% Complete	PQAO Crit. Met	QAPP Appr.	AQS Rec Flag	CA Rec Flag	EPA Concur
32-031-0016	1	SLAMS	16.69	2.0	61.0	0	0	100	-0.82	100			Y	Y	Y		

Data Evaluation and Concurrence Report for Particulate Matter

Certifying Year: 2016
Certifying Agency: Washoe County District Health Department (1138)

Parameter: PM2.5 - Local Conditions (88101)
PQAO Name: Washoe County District Health Department (1138)
Quality Assurance Project Plan Approval Date: 02/12/2013

Collocation Summary

Method	# Sites	# Sites Req	# Sites Collocated	% Collocated	CV Est	CV UB	Criteria Met?
170	2	1	1	100	12.12	13.43	Y

PEP Summary

# Methods	# Audited Methods	# PEP Required	# PEP Submitted	% Complete	Bias	Criteria Met?
1	1	5	4	80	+40.65	Y

Monitors Summaries

				Routine Data (ug/m3)						Flow Rate Audit		Collocation			PEP PQAO		Concurrence Flag		
AQS Site ID	POC	Method	Monitor Type	Mean	Min	Max	Exceed. Count	Outlier Count	% Complete	Bias	% Complete	CV	% Complete	PQAO Crit. Met	Crit. Met	QAPP Appr.	AQS Rec Flag	CA Rec Flag	EPA Concur
32-031-0016	1	142	SLAMS	5.48	.8	23.5		0	100	-0.52	100			Y	Y	Y	Y		
32-031-0016	3	170	SLAMS	6.56	-8.0	82.0		0	98	-1.25	100	13.43	100	Y	Y	Y	Y		
32-031-1005	1	170	SLAMS	7.05	-4.0	71.0		0	98	-0.79	100			Y	Y	Y	Y		

Data Concurrence and Evaluation Report for Lead

APPENDIX C

EXCEPTIONAL EVENT INITIAL NOTIFICATION

Initial Notification of Potential Exceptional Event Information Summary

Submitting Agency: Washoe County Health District, Air Quality Management Division
Agency Contact: Daniel Inouye, Branch Chief
Date Submitted: November 10, 2016
Applicable NAAQS: 2015 8-Hour Ozone
Affected Regulatory Decision[1]: Attainment of the 2015 8-Hour Ozone NAAQS
Area Name/Designation Status: Washoe County Attainment Area
Design Value Period: 2014-2016

Narrative: Smoke from several wildfires throughout the West in July and August 2016 impacted the Reno/Sparks area. The smoke impacts contributed to several exceedances of the National Ambient Air Quality Standards (NAAQS) for Ozone (O_3) and elevated levels of Particulate Matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$) at several sites in the Washoe County Health District, Air Quality Management Division's (AQMD) monitoring network. The AQMD requests that the Regional Administrator for Region IX of the U.S. Environmental Protection Agency (EPA) accept this Initial Notification so Exceptional Events Demonstration documents can be prepared to petition for the exclusion of the air quality monitoring data effected from these fires from the normal planning and regulatory requirements under the Clean Air Act (CAA) in accordance with the Exceptional Events Rule (EER).

Table A: Information specific to each flagged site day that may be submitted to EPA in support of the affected regulatory decision listed above

Date(s) of Event	NAAQS	Type of Event (high wind, volcano, wildfires/prescribed burns, other[2])	AQS Flag	Site AQS ID	POC	Site Name	Monitor Concentration
07/02/2016	Ozone	Wildfires	RT	32-031-0016	1	Reno3	0.073 ppm
07/03/2016	Ozone	Wildfires	RT	32-031-0016	1	Reno3	0.073 ppm
07/04/2016	Ozone	Wildfires	RT	32-031-0016	1	Reno3	0.073 ppm
07/25/2016	Ozone	Wildfires	RT	32-031-0016	1	Reno3	0.071 ppm

Table B: Violating Sites Information for **8-Hour Ozone** (listing of all violating sites[3] in the planning area, regardless of operating agency, and regardless of whether or not they are affected by EEs)

Site (AQS ID)	Design Value (<u>without</u> EPA concurrence on all events listed in Table A above)	Design Value (<u>with</u> EPA concurrence on all events listed in Table A above)
Reno3 (32-031-0016)	0.072 ppm*	0.070 ppm*

*Design values assume concurrence with the 2015 Wildfire Ozone Exceptional Event

Table C: Summary of Maximum Design Value (DV) Site Information for **8-Hour Ozone** (Effect of EPA Concurrence on Maximum Design Value Site Determination)

Maximum DV site (AQS ID) **<u>without</u> EPA concurrence** on any of the events listed in Table A above	Design Value 0.072 ppm	Design Value Site Reno3 (32-031-0016)	Comment Design value assumes concurrence with the 2015 Wildfire Ozone EE.
Maximum DV site (AQS ID) **<u>with</u> EPA concurrence** on all events listed in Table A above	Design Value 0.070 ppm	Design Value Site Reno3 (32-031-0016)	Comment Design value assumes concurrence with the 2015 Wildfire Ozone EE.

Table D: Site(s) with Invalid $PM_{2.5}$ or Ozone Design Values

Site Name (AQS ID)	Parameter(s)	Reason for Invalid Design Value(s)	Comments
none	n/a	n/a	n/a

[1] designation, classification, attainment determination, attainment date extension, or finding of SIP inadequacy leading to SIP call
[2] Provide additional information for types of event described as “other”
[3] Note if violating monitor is a near-road monitor

Supporting Tables

Table E: $PM_{2.5}$ 24-hour averages and 1-hour maximums from the Reno3 and Sparks monitoring sites on Exceptional Event Days in 2016

Date	Reno3 (32-031-0016)		Sparks (32-031-1005)	
	24-hr Avg ($\mu g/m^3$)	1-hr Max ($\mu g/m^3$)	24-hr Avg ($\mu g/m^3$)	1-hr Max ($\mu g/m^3$)
7/2	24	49	23	47
7/3	24	38	22	37
7/4	17	27	16	29
7/25	12	32	12	32

APPENDIX D

PUBLIC INSPECTION PLAN

A public notice was published in the Reno Gazette-Journal on April 14, 2017 notifying the public that the "Exceptional Events Demonstration for Ozone Exceedances in Washoe County, Nevada from the Trailhead Fire on July 2 through July 4, 2016" was available for public inspection and comment from April 14 through May 14, 2017. A hard copy was available at the AQMD office and on the website (OurCleanAir.com).

This exceptional event demonstration underwent 30-day public comment concurrent with EPA Region 9's review beginning April 14, 2017 pursuant to 40 CFR 50.14(c)(3)(v). By June 1, 2017, AQMD will forward any written comments received and provide documentation that the public comment process was followed.

APPENDIX E

NOAA LOCAL CLIMATOLOGICAL DATA (JUNE 2016, JULY 2016)

JUNE 2016
LOCAL CLIMATOLOGICAL DATA
NOAA, National Climatic Data Center

RENO, NV
RENO/TAHOE INTERNATIONAL AIRPORT (KRNO)
Lat:39° 29'N Long: 119° 46'W Elev (Ground) 4410 Feet
Time Zone : PACIFIC WBAN: 23185 ISSN#: 0198-3334

Date	Temperature °F						Deg Days BASE 65°		WEATHER	SNOW/ICE ON GND(IN)		PRECIPITATION ON GND(IN)		PRESSURE (INCHES OF HG)		WIND SPEED = MPH DIR = TENS OF DEGREES							Date
										0400 LST	1000 LST	2400 LST	2400 LST						MAXIMUM 3-SEC		MAXIMUM 2-MIN		
	MAXIMUM	MINIMUM	AVERAGE	DEP FROM NORMAL	AVERAGE DEW PT	AVERAGE WET BULB	HEATING	COOLING		DEPTH	WATER-EQUIV	SNOW-FALL	WATER EQUIV	AVERAGE STATION	AVERAGE SEA LEVEL	RESULTANT SPEED	RES DIR	AVERAGE SPEED	SPEED	DIR	SPEED	DIR	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
01	91	61	76	15	35	55	0	11		0		0.0	0.00	25.56	29.87	7.8	29	8.6	35	27	28	30	01
02	92	51	72	11	24	50	0	7		0		0.0	0.00	25.66	30.00	4.5	27	5.9	27	31	21	28	02
03	96	57	77	15	29	53	0	12		0		0.0	0.00	25.70	30.03	0.6	01	4.7	19	08	14	08	03
04	95	59	77	15	36	56	0	12		0		0.0	0.00	25.61	29.92	4.0	29	5.5	31	29	16	31	04
05	89	65	77	15	38	55	0	12	RA	0		0.0	T	25.55	29.85	4.1	31	8.5	37	29	23	30	05
06	90	58	74	12	42	57	0	9		0		0.0	0.00	25.49	29.80	2.4	29	4.9	20	29	14	29	06
07	96	63	80	18	45	59	0	15		0		0.0	0.00	25.52	29.81	5.6	28	6.9	31	28	22	29	07
08	92	60	76	13	30	53	0	11		0		0.0	0.00	25.50	29.79	7.5	23	9.6	40	19	25	20	08
09	88	56	72	9	32	52	0	7		0		0.0	0.00	25.47	29.78	7.0	26	9.4	39	25	23	28	09
10	84	54	69	6	31	50	0	4		0		0.0	0.00	25.48	29.81	3.4	23	13.1	43	20	32	18	10
11	77	52	65	2	36	50	0	0	RA	0		0.0	T	25.58	29.94	3.2	33	5.0	26	30	17	35	11
12	79	52	66	2	34	50	0	1		0		0.0	0.00	25.63	29.99	0.7	29	5.5	21	04	16	36	12
13	83	54	69	5	34	51	0	4		0		0.0	0.00	25.56	29.92	6.5	28	8.3	32	30	26	30	13
14	78	55	67	3	24	47	0	2		0		0.0	0.00	25.44	29.77	7.5	27	11.3	37	20	28	19	14
15	73	48	61	-3	27	43	4	0		0		0.0	0.00	25.43	29.78	4.7	24	10.6	43*	18	33*	19	15
16	72	43*	58*	-6	28	44	7	0		0		0.0	0.00	25.56	29.95	4.8	23	10.1	30	19	24	20	16
17	76	46	61	-4	34	48	4	0		0		0.0	0.00	25.58	29.96	5.0	20	7.6	30	18	24	18	17
18	80	60	70	5	38	53	0	5		0		0.0	0.00	25.66	30.01	9.4	21	14.2	36	18	30	19	18
19	90	51	71	5	33	52	0	6		0		0.0	0.00	25.69	30.06	2.6	21	6.6	23	24	17	22	19
20	96	53	75	9	27	52	0	10		0		0.0	0.00	25.68	30.01	3.9	22	6.7	24	26	16	16	20
21	97	57	77	11	26	52	0	12		0		0.0	0.00	25.66	29.98	4.5	29	7.0	28	28	20	29	21
22	96	57	77	11	28	52	0	12		0		0.0	0.00	25.59	29.90	5.7	28	7.6	33	29	25	28	22
23	91	56	74	8	21	50	0	9		0		0.0	0.00	25.61	29.93	5.7	27	9.0	35	27	25	28	23
24	90	60	75	8	27	52	0	10		0		0.0	0.00	25.63	29.96	4.7	31	7.6	27	29	18	34	24
25	92	55	74	7	29	52	0	9		0		0.0	0.00	25.65	29.98	1.2	34	4.9	17	35	13	36	25
26	98	62	80	12	34	56	0	15		0		0.0	0.00	25.65	29.96	5.9	30	7.6	28	30	23	30	26
27	100	61	81	13	33	55	0	16		0		0.0	0.00	25.68	30.00	4.4	30	5.6	25	29	20	31	27
28	101*	64	83	15	31	56	0	18		0		0.0	0.00	25.66	29.97	4.7	29	6.4	26	29	20	29	28
29	100	67	84*	15	32	56	0	19		0		0.0	0.00	25.61	29.90	6.5	29	8.0	40	29	24	29	29
30	100	61	81	12	29	54	0	16		0		0.0	0.00	25.56	29.85	6.4	30	7.5	27	30	22	30	30
	89.4	56.6	73.0	¤	31.6	52.2	0.5	8.8	< MONTHLY AVERAGES | TOTALS >			0.0	T	25.59	29.92	4.0	27	7.8	< MONTHLY AVERAGES				
	6.1	4.6	5.3		<---------- DEPARTURE FROM NORMAL ---------->								-0.51	SUNSHINE, CLOUD, & VISIBILITY TABLES ON PAGE 3									

JUNE 2016
RENO, NV

DEGREE DAYS

	MONTHLY TOTAL	MONTHLY DEPARTURE	SEASON TO DATE TOTAL	SEASON TO DATE DEPARTURE
HEATING :	15	-41	4332	-592
COOLING :	264	128	292	119

GREATEST 24-HR PRECIPITATION :	T	DATE :	11+
GREATEST 24-HR SNOWFALL :	0.0	DATE :	
GREATEST SNOW DEPTH :	0	DATE :	

SEA LEVEL PRESSURE		DATE	TIME
MAXIMUM :	30.17	19	0723
MIMIMUM :	29.66	15	1129

NUMBER OF -> DAYS WITH

MAXIMUM TEMP >= 90 :	19	MINIMUM TEMP <= 32 :	0
MAXIMUM TEMP <= 32 :	0	MINIMUM TEMP <= 0 :	0
THUNDERSTORMS :	0	HEAVY FOG :	0

PRECIPITATION >= 0.01 INCH:	0
PRECIPITATION >= 0.10 INCH:	0
SNOWFALL >= 1.0 INCH :	0

HOURLY PRECIPITATION
(WATER EQUIVALENT IN INCHES)

RENO, NV (KRNO)
JUNE 2016

WBAN # 23185

Date	FOR HOUR (LST) ENDING AT												Date	FOR HOUR (LST) ENDING AT												Date	Sum of Hourly Data	2400 LST Water Equiv.
	1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16	17	18	19	20	21	22	23	24			
01													01													01	0.00	0.00
02													02													02	0.00	0.00
03													03													03	0.00	0.00
04													04													04	0.00	0.00
05						T							05													05	T	T
06													06													06	0.00	0.00
07													07													07	0.00	0.00
08													08													08	0.00	0.00
09													09													09	0.00	0.00
10													10													10	0.00	0.00
11													11					T	T							11	T	T
12													12													12	0.00	0.00
13													13													13	0.00	0.00
14													14													14	0.00	0.00
15													15													15	0.00	0.00
16													16													16	0.00	0.00
17													17													17	0.00	0.00
18													18													18	0.00	0.00
19													19													19	0.00	0.00
20													20													20	0.00	0.00
21													21													21	0.00	0.00
22													22													22	0.00	0.00
23													23													23	0.00	0.00
24													24													24	0.00	0.00
25													25													25	0.00	0.00
26													26													26	0.00	0.00
27													27													27	0.00	0.00
28													28													28	0.00	0.00
29													29													29	0.00	0.00
30													30													30	0.00	0.00

*** Indicates sum of Hourly and Daily disagree.**

MAXIMUM SHORT DURATION PRECIPITATION (See Note)

Time Period (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (Inches)												
Ending Date												
Ending Time (Hr/Min)												

Date and time are not entered for TRACE amounts.

Note : The hourly and daily precipitation totals are printed in the last 2 columns and hi-lighted in red when they disagree. NWS does not edit ASOS hourly values but may edit daily and monthly totals. Hourly, daily, and monthly totals are printed as reported by the ASOS site.

REFERENCE NOTES & SUPPLEMENTAL SUMMARIES

*** = Extreme for the month (last occurence if more than one).**

T = Trace precipitation amount.

+ = also occurs on earlier date.

FG+ = Heavy fog, visibility .25 miles or less.

BLANK entries denote missing or unreported data.

Resultant wind is the vector sum of the wind speeds and directions divided by the number of observations.

Wind direction is recorded in tens of degrees (2 digits) clockwise from true north. '00' = calm, 'VR' = variable.

Precipitation is for the 24-hour period ending at the time indicated in the column heading.

Ceilometer (30-second) data are used to derive cloudiness at or below 12,000 feet. This cloudiness is the mean cloud cover detected during sunrise to sunset (SR-SS), or midnight to midnight (MN-MN).

WEATHER NOTATIONS

QUALIFIER	WEATHER PHENOMENA		
DESCRIPTOR	PRECIPITATION	OBSCURATION	OTHER
BC Patches	DZ Drizzle	BR Mist	DS Duststorm
BL Blowing	GR Hail	DU Widespread Dust	FC Funnel Cloud
DR Low Drifting	GS Small Hail and/or Snow Pellets	FG Fog	+FC Tornado Waterspout
FZ Freezing	IC Ice Crystals	FU Smoke	PO Well-Developed Dust/Sand Whirls
MI Shallow	PL Ice Pellets	HZ Haze	
PR Partial	RA Rain		
SH Shower(s)	SG Snow Grains	PY Spray	SQ Squalls
TS Thunderstorm	SN Snow	SA Sand	SS Sandstorm
VC In the Vicinity	UP Unkown Precipitation	VA Volcanic Ash	GL Glaze

Intensity (as indicated on pages 4 to 6):
'+' = Heavy ' ' = Moderate '-' = Light

RENO, NV
JUNE 2016

Sky Condition is based on the sum (not to exceed 8) of the sunrise to sunset cloud cover below and above 12,000 feet.

Clear = 0-2 oktas, Partly Cloudy = 3-6 oktas, Cloudy = 7-8 oktas.

A Heating (Cooling) Degree Day is the difference between the average daily temperature and 65 degrees F. The HDD season begins July 1, the CDD season begins January 1.

Snow Depth, Snowfall, and Sunshine data may come from nearby sites that the National Weather Service deems Climatologically representative of this site.

NORMALS ARE FOR THE YEARS 1981-2010

ADDITIONAL NOTES & ERRATA:

Date	VISIBILITY (MILES) MINIMUM	VISIBILITY (MILES) MAXIMUM
01	10.00	10.00
02	10.00	10.00
03	10.00	10.00
04	10.00	10.00
05	10.00	10.00
06	10.00	10.00
07	10.00	10.00
08	10.00	10.00
09	10.00	10.00
10	10.00	10.00
11	10.00	10.00
12	10.00	10.00
13	10.00	10.00
14	10.00	10.00
15	10.00	10.00
16	10.00	10.00
17	10.00	10.00
18	10.00	10.00
19	10.00	10.00
20	10.00	10.00
21	10.00	10.00
22	10.00	10.00
23	10.00	10.00
24	10.00	10.00
25	10.00	10.00
26	10.00	10.00
27	10.00	10.00
28	10.00	10.00
29	10.00	10.00
30	10.00	10.00
AVGS	10.00	10.00

MINIMUM VISIBILTY (MILES)

<= .25	<= 3.0	>= 7.0
0	0	30

OBSERVATIONS AT 3-HOURLY INTERVALS

RENO, NV
JUNE 2016 **KRNO** **WBAN # 23185**

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	TEMPERATURE °F DEW POINT	TEMPERATURE °F WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	WIND DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	PRESSURE (INCHES, HG) SEA LEVEL
				SUNRISE: 0434	**JUN 01**		**SUNSET: 1919**					
01	FEW	200	10.00		68	44	55	42	8	28	25.57	29.88
04	FEW	200	10.00		62	43	52	50	3	29	25.57	29.88
07	SCT	250	10.00		66	44	54	45	0	00	25.58	29.89
10	SCT	250	10.00		82	43	59	25	0	00	25.56	29.86
13	BKN	250	10.00		89	37	60	16	9	26	25.53	29.82
16	BKN	200	10.00		89	31	58	12	15	25	25.52	29.81
19	BKN	190	10.00		82	13	51	7	11	29	25.55	29.87
22	FEW	210	10.00		72	33	52	24	11	28	25.61	29.93
				SUNRISE: 0434	**JUN 02**		**SUNSET: 1920**					
01	CLR	NC	10.00		60	30	46	32	7	18	25.63	29.95
04	FEW	200	10.00		55	27	42	34	0	00	25.65	29.98
07	BKN	220	10.00		60	30	46	32	0	00	25.70	30.05
10	BKN	220	10.00		75	26	51	16	5	23	25.69	30.02
13	BKN	220	10.00		87	16	53	7	7	18	25.64	29.97
16	SCT	220	10.00		90	18	55	7	14	28	25.62	29.96
19	FEW	220	10.00		83	22	53	10	16	30	25.66	30.00
22	CLR	NC	10.00		72	27	50	19	0	00	25.71	30.05
				SUNRISE: 0433	**JUN 03**		**SUNSET: 1921**					
01	CLR	NC	10.00		63	28	46	27	5	28	25.74	30.07
04	FEW	200	10.00		58	30	45	35	3	29	25.76	30.10
07	FEW	200	10.00		64	33	49	32	3	VR	25.78	30.13
10	CLR	NC	10.00		81	30	54	16	0	00	25.75	30.08
13	FEW	200	10.00		90	25	56	9	5	15	25.69	30.02
16	FEW	200	10.00		93	22	57	7	5	05	25.65	29.97
19	FEW	200	10.00		89	22	55	8	8	09	25.63	29.95
22	FEW	200	10.00		77	40	56	26	3	29	25.68	29.99
				SUNRISE: 0433	**JUN 04**		**SUNSET: 1922**					
01	CLR	NC	10.00		69	38	53	32	5	25	25.68	29.98
04	FEW	250	10.00		63	40	51	43	3	27	25.68	29.99
07	BKN	250	10.00		67	40	53	37	3	18	25.69	30.01
10	BKN	250	10.00		85	34	57	16	3	VR	25.67	29.97
13	BKN	180	10.00		93	31	59	11	5	VR	25.61	29.91
16	BKN	210	10.00		94	28	59	9	7	25	25.55	29.85
19	BKN	230	10.00		86	45	62	24	15	30	25.53	29.83
22	BKN	200	10.00		81	36	56	20	10	28	25.57	29.85
				SUNRISE: 0433	**JUN 05**		**SUNSET: 1922**					
01	CLR	NC	10.00		76	37	55	24	6	VR	25.58	29.85
04	BKN	200	10.00		68	40	53	36	6	19	25.58	29.87
07	SCT	110	10.00		73	42	56	33	5	VR	25.60	29.89
10	BKN	150	10.00		80	32	55	17	3	35	25.58	29.86
13	SCT	150	10.00		88	29	57	12	7	VR	25.53	29.81
16	BKN	150	10.00		84	38	58	19	23	30	25.52	29.82
19	BKN	150	10.00		76	39	56	26	20	36	25.56	29.87
22	BKN	200	10.00		70	43	55	38	9	01	25.56	29.87
				SUNRISE: 0433	**JUN 06**		**SUNSET: 1923**					
01	BKN	200	10.00		65	43	53	45	7	31	25.54	29.84
04	BKN	250	10.00		61	43	51	52	3	23	25.53	29.85
07	FEW	250	10.00		66	43	53	43	5	29	25.53	29.86
10	FEW	250	10.00		79	42	58	27	3	VR	25.52	29.83
13	SCT	085	10.00		87	39	60	18	7	VR	25.48	29.78
16	SCT	100	10.00		88	33	58	14	3	VR	25.43	29.72
19	FEW	100	10.00		84	49	63	30	13	26	25.44	29.72
22	SCT	250	10.00		77	49	60	37	5	05	25.50	29.78
				SUNRISE: 0432	**JUN 07**		**SUNSET: 1923**					
01	FEW	200	10.00		72	49	58	44	3	24	25.52	29.80
04	FEW	180	10.00		64	48	55	56	0	00	25.53	29.83
07	FEW	200	10.00		71	49	58	46	0	00	25.55	29.85
10	FEW	090	10.00		85	46	62	26	5	21	25.53	29.82
13	SCT	250	10.00		94	40	62	15	9	32	25.51	29.78
16	BKN	200	10.00		93	45	64	19	16	28	25.48	29.77
19	BKN	190	10.00		83	46	61	27	20	28	25.50	29.79
22	SCT	210	10.00		76	45	58	33	8	29	25.55	29.84
				SUNRISE: 0432	**JUN 08**		**SUNSET: 1924**					
01	SCT	200	10.00		67	44	54	44	5	22	25.54	29.83
04	SCT	200	10.00		61	43	51	52	0	00	25.54	29.84
07	BKN	250	10.00		70	41	54	35	0	00	25.54	29.84
10	BKN	250	10.00		85	35	57	17	0	00	25.52	29.80
13	BKN	250	10.00		89	26	56	10	21	19	25.48	29.77
16	BKN	240	10.00		91	23	56	8	18	22	25.45	29.74
19	SCT	240	10.00		80	16	51	9	15	24	25.47	29.75
22	FEW	180	10.00		71	23	48	16	8	26	25.50	29.79
				SUNRISE: 0432	**JUN 09**		**SUNSET: 1925**					
01	FEW	200	10.00		64	25	46	23	3	01	25.49	29.78
04	FEW	180	10.00		59	31	46	35	5	13	25.49	29.79
07	FEW	180	10.00		66	36	50	33	0	00	25.51	29.81
10	FEW	200	10.00		77	32	53	19	0	00	25.48	29.79
13	FEW	200	10.00		86	31	57	14	22	17	25.47	29.75
16	FEW	200	10.00		83	32	56	16	20	29	25.45	29.75
19	SCT	200	10.00		75	32	53	21	16	28	25.46	29.76
22	FEW	200	10.00		67	35	51	31	10	28	25.48	29.80
				SUNRISE: 0432	**JUN 10**		**SUNSET: 1925**					
01	FEW	200	10.00		62	35	48	37	0	00	25.48	29.78
04	FEW	180	10.00		56	36	46	47	3	09	25.47	29.78
07	FEW	200	10.00		64	32	48	30	5	35	25.48	29.80
10	FEW	250	10.00		79	31	54	17	28	18	25.48	29.77
13	SCT	240	10.00		83	23	53	11	20	19	25.48	29.78
16	SCT	180	10.00		79	27	53	15	17	30	25.48	29.80
19	BKN	250	10.00		72	30	51	21	17	30	25.50	29.83
22	FEW	200	10.00		62	34	48	35	8	02	25.56	29.88
				SUNRISE: 0432	**JUN 11**		**SUNSET: 1926**					
01	FEW	200	10.00		57	34	46	42	5	09	25.55	29.88
04	FEW	200	10.00		53	32	43	45	5	36	25.60	29.95
07	SCT	200	10.00		56	33	45	42	6	03	25.62	29.98
10	SCT	190	10.00		65	33	49	31	5	VR	25.61	29.97
13	BKN	180	10.00		74	33	53	22	3	VR	25.57	29.92
16	BKN	150	10.00		75	33	53	22	8	08	25.54	29.90
19	BKN	150	10.00		67	43	54	42	6	28	25.56	29.93
22	SCT	180	10.00		61	45	52	56	7	29	25.58	29.94
				SUNRISE: 0432	**JUN 12**		**SUNSET: 1926**					
01	SCT	180	10.00		56	43	49	62	6	30	25.58	29.93
04	BKN	180	10.00		53	41	47	64	6	29	25.61	29.98
07	BKN	160	10.00		57	40	48	53	0	00	25.65	30.03
10	BKN	170	10.00		70	26	49	19	6	VR	25.65	30.01
13	BKN	160	10.00		74	28	51	18	3	16	25.63	29.99
16	BKN	200	10.00		78	27	52	15	13	36	25.61	29.96
19	SCT	200	10.00		73	35	53	25	6	VR	25.62	29.98
22	CLR	NC	10.00		65	40	52	40	3	VR	25.64	30.00

OBSERVATIONS AT 3-HOURLY INTERVALS

RENO, NV

JUNE 2016 **KRNO** **WBAN # 23185**

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	TEMPERATURE °F DEW POINT	TEMPERATURE °F WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	WIND DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	PRESSURE (INCHES, HG) SEA LEVEL
				SUNRISE: 0432 JUN 13 SUNSET: 1927								
01	CLR	NC	10.00		59	39	49	48	0	00	25.64	30.00
04	CLR	NC	10.00		55	40	47	57	6	21	25.64	30.00
07	CLR	NC	10.00		61	40	50	46	3	14	25.66	30.02
10	FEW	075	10.00		74	36	54	25	6	16	25.62	29.96
13	SCT	250	10.00		82	32	55	16	22	28	25.55	29.88
16	SCT	200	10.00		79	32	54	18	22	28	25.52	29.85
19	BKN	220	10.00		73	30	51	20	13	31	25.50	29.84
22	BKN	200	10.00		67	29	48	24	3	19	25.51	29.83
				SUNRISE: 0431 JUN 14 SUNSET: 1927								
01	BKN	180	10.00		64	28	47	26	6	28	25.48	29.79
04	SCT	180	10.00		63	5	41	10	14	22	25.47	29.77
07	SCT	200	10.00		64	9	42	11	10	30	25.50	29.82
10	BKN	250	10.00		71	23	48	16	10	30	25.47	29.79
13	BKN	250	10.00		74	27	51	17	15	26	25.44	29.75
16	BKN	230	10.00		70	29	50	22	6	VR	25.40	29.72
19	BKN	170	10.00		67	30	49	25	8	26	25.42	29.74
22	SCT	200	10.00		57	31	45	37	11	29	25.45	29.78
				SUNRISE: 0432 JUN 15 SUNSET: 1927								
01	SCT	200	10.00		54	29	42	38	0	00	25.42	29.76
04	FEW	200	10.00		49	31	41	50	5	20	25.41	29.76
07	SCT	220	10.00		56	32	45	40	0	00	25.40	29.73
10	BKN	150	10.00		71	32	51	24	9	30	25.35	29.67
13	BKN	120	10.00		64	31	48	29	31	19	25.36	29.70
16	BKN	120	10.00		57	22	42	26	3	VR	25.48	29.86
19	BKN	120	10.00		54	18	39	24	15	27	25.49	29.87
22	SCT	080	10.00		50	24	39	36	9	29	25.53	29.88
				SUNRISE: 0432 JUN 16 SUNSET: 1928								
01	SCT	070	10.00		47	24	37	41	0	00	25.52	29.91
04	FEW	120	10.00		45	26	37	48	6	VR	25.53	29.95
07	SCT	120	10.00		51	27	40	39	7	06	25.59	29.99
10	SCT	120	10.00		62	27	46	26	8	04	25.57	29.96
13	SCT	120	10.00		68	23	47	18	22	19	25.57	29.95
16	SCT	220	10.00		68	28	49	22	20	21	25.57	29.96
19	BKN	200	10.00		65	34	49	32	15	27	25.55	29.94
22	BKN	200	10.00		59	34	47	39	13	29	25.59	29.96
				SUNRISE: 0432 JUN 17 SUNSET: 1928								
01	SCT	180	10.00		53	32	43	45	5	04	25.60	29.97
04	FEW	120	10.00		48	32	41	54	3	26	25.61	29.99
07	SCT	150	10.00		55	34	45	45	0	00	25.63	30.02
10	SCT	160	10.00		69	31	50	24	8	33	25.61	29.98
13	BKN	150	10.00		73	30	51	20	8	25	25.59	29.95
16	BKN	170	10.00		74	35	53	24	9	21	25.56	29.93
19	SCT	180	10.00		69	38	52	32	10	22	25.56	29.93
22	FEW	140	10.00		64	38	50	38	13	15	25.58	29.93
				SUNRISE: 0432 JUN 18 SUNSET: 1929								
01	FEW	100	10.00		65	38	51	37	23	18	25.56	29.89
04	SCT	150	10.00		64	39	51	40	23	19	25.56	29.90
07	BKN	065	10.00		68	40	53	36	16	23	25.63	29.98
10	BKN	200	10.00		73	39	54	29	18	18	25.68	30.03
13	BKN	220	10.00		73	35	53	25	0	00	25.68	30.03
16	SCT	190	10.00		78	39	56	25	14	30	25.67	30.01
19	FEW	200	10.00		71	39	54	31	3	VR	25.69	30.04
22	CLR	NC	10.00		65	40	52	40	5	32	25.74	30.11

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	TEMPERATURE °F DEW POINT	TEMPERATURE °F WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	WIND DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	PRESSURE (INCHES, HG) SEA LEVEL
				SUNRISE: 0432 JUN 19 SUNSET: 1929								
01	CLR	NC	10.00		57	41	49	55	3	30	25.76	30.14
04	CLR	NC	10.00		52	40	46	64	6	30	25.76	30.15
07	FEW	250	10.00		59	40	49	49	0	00	25.77	30.16
10	BKN	250	10.00		73	30	51	20	6	VR	25.74	30.10
13	BKN	250	10.00		84	30	56	14	10	06	25.69	30.03
16	BKN	250	10.00		89	26	56	10	16	22	25.62	29.96
19	BKN	230	10.00		84	24	54	11	11	18	25.64	29.98
22	SCT	230	10.00		73	36	53	26	10	29	25.68	30.01
				SUNRISE: 0432 JUN 20 SUNSET: 1929								
01	FEW	180	10.00		65	32	49	29	5	32	25.68	30.01
04	FEW	180	10.00		55	29	43	37	3	19	25.69	30.03
07	FEW	200	10.00		63	33	48	33	0	00	25.71	30.05
10	FEW	250	10.00		84	23	54	10	9	13	25.69	30.01
13	SCT	250	10.00		93	21	57	7	8	25	25.67	29.98
16	SCT	250	10.00		90	27	57	10	16	16	25.65	29.98
19	BKN	250	10.00		85	27	55	12	9	27	25.67	30.00
22	BKN	210	10.00		76	28	52	17	10	29	25.69	30.01
				SUNRISE: 0432 JUN 21 SUNSET: 1929								
01	SCT	200	10.00		67	28	48	23	8	12	25.71	30.02
04	SCT	200	10.00		59	28	45	31	0	00	25.72	30.06
07	BKN	250	10.00		67	30	49	25	0	00	25.75	30.09
10	FEW	250	10.00		83	20	53	10	0	00	25.72	30.03
13	FEW	250	10.00		94	19	57	6	8	25	25.65	29.96
16	FEW	220	10.00		95	23	58	7	16	29	25.60	29.90
19	FEW	180	10.00		86	31	57	14	17	30	25.60	29.91
22	CLR	NC	10.00		77	33	54	20	3	25	25.64	29.94
				SUNRISE: 0432 JUN 22 SUNSET: 1930								
01	CLR	NC	10.00		64	34	49	33	0	00	25.63	29.94
04	CLR	NC	10.00		59	35	47	41	0	00	25.63	29.94
07	CLR	NC	10.00		67	32	49	27	3	19	25.63	29.95
10	CLR	NC	10.00		84	24	54	11	3	VR	25.61	29.91
13	CLR	NC	10.00		94	20	57	7	18	28	25.55	29.85
16	CLR	NC	10.00		91	23	56	8	20	28	25.55	29.86
19	CLR	NC	10.00		83	25	54	12	8	31	25.57	29.88
22	CLR	NC	10.00		75	25	51	15	7	30	25.61	29.91
				SUNRISE: 0433 JUN 23 SUNSET: 1930								
01	CLR	NC	10.00		64	29	47	27	5	22	25.61	29.91
04	CLR	NC	10.00		59	31	46	35	0	00	25.61	29.93
07	CLR	NC	10.00		69	31	50	24	3	08	25.63	29.94
10	CLR	NC	10.00		83	10	51	6	8	08	25.61	29.92
13	CLR	NC	10.00		89	5	53	4	16	30	25.61	29.91
16	CLR	NC	10.00		87	11	53	6	21	24	25.61	29.93
19	CLR	NC	10.00		79	27	53	15	13	29	25.61	29.93
22	CLR	NC	10.00		72	28	50	19	5	05	25.63	29.94
				SUNRISE: 0433 JUN 24 SUNSET: 1930								
01	CLR	NC	10.00		68	29	49	23	3	25	25.62	29.93
04	CLR	NC	10.00		63	33	48	33	7	22	25.62	29.95
07	CLR	NC	10.00		69	35	51	29	11	05	25.66	29.98
10	CLR	NC	10.00		78	25	52	14	3	VR	25.65	29.98
13	CLR	NC	10.00		87	16	53	7	14	28	25.62	29.93
16	CLR	NC	10.00		88	19	54	8	7	33	25.61	29.92
19	CLR	NC	10.00		83	25	54	12	13	30	25.61	29.93
22	CLR	NC	10.00		74	39	55	28	14	32	25.67	29.99

OBSERVATIONS AT 3-HOURLY INTERVALS

RENO, NV
JUNE 2016 KRNO WBAN # 23185

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	WIND DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	SEA LEVEL
				SUNRISE: 0433 JUN 25 SUNSET: 1930								
01	CLR	NC	10.00		66	26	47	22	0	00	25.69	30.01
04	CLR	NC	10.00		58	32	45	38	3	30	25.70	30.04
07	CLR	NC	10.00		63	32	48	31	0	00	25.72	30.07
10	CLR	NC	10.00		77	25	51	14	3	VR	25.69	30.02
13	CLR	NC	10.00		84	23	54	10	6	18	25.64	29.97
16	FEW	250	10.00		90	24	56	9	7	VR	25.59	29.91
19	FEW	250	10.00		89	28	57	11	7	VR	25.58	29.89
22	CLR	NC	10.00		78	40	57	26	5	27	25.64	29.96
				SUNRISE: 0434 JUN 26 SUNSET: 1930								
01	CLR	NC	10.00		70	41	54	35	5	28	25.65	29.96
04	FEW	180	10.00		62	41	51	46	0	00	25.67	29.99
07	CLR	NC	10.00		69	40	53	35	3	32	25.69	30.00
10	FEW	250	10.00		84	34	57	17	0	00	25.67	29.98
13	SCT	250	10.00		94	28	59	9	8	06	25.62	29.92
16	FEW	250	10.00		95	26	58	8	18	29	25.60	29.90
19	FEW	220	10.00		88	31	57	13	16	30	25.63	29.94
22	CLR	NC	10.00		78	34	55	20	10	35	25.69	30.00
				SUNRISE: 0434 JUN 27 SUNSET: 1930								
01	CLR	NC	10.00		71	38	53	30	7	31	25.70	30.00
04	FEW	120	10.00		63	36	49	37	0	00	25.73	30.05
07	FEW	250	10.00		69	37	52	31	5	26	25.75	30.07
10	CLR	NC	10.00		84	35	57	17	5	07	25.71	30.02
13	FEW	200	10.00		96	28	59	9	5	VR	25.67	29.96
16	FEW	180	10.00		97	25	59	7	10	29	25.63	29.94
19	FEW	180	10.00		90	32	58	13	16	31	25.65	29.95
22	CLR	NC	10.00		81	36	56	20	7	VR	25.68	29.98
				SUNRISE: 0434 JUN 28 SUNSET: 1930								
01	CLR	NC	10.00		71	36	53	28	5	30	25.69	29.99
04	CLR	NC	10.00		65	35	50	33	0	00	25.71	30.02
07	CLR	NC	10.00		71	36	53	28	5	23	25.73	30.04
10	CLR	NC	10.00		85	36	58	17	0	00	25.69	30.00
13	FEW	100	10.00		96	19	57	6	5	VR	25.65	29.94
16	FEW	150	10.00		97	25	59	7	15	26	25.61	29.91
19	SCT	180	10.00		91	31	58	12	13	29	25.62	29.92
22	FEW	180	10.00		82	36	57	19	0	00	25.66	29.95
				SUNRISE: 0435 JUN 29 SUNSET: 1930								
01	FEW	100	10.00		75	38	55	26	3	28	25.65	29.93
04	SCT	100	10.00		68	40	53	36	3	30	25.65	29.94
07	FEW	120	10.00		73	39	54	29	5	29	25.67	29.97
10	SCT	200	10.00		88	33	58	14	3	VR	25.65	29.93
13	SCT	200	10.00		97	28	60	9	6	VR	25.59	29.86
16	FEW	120	10.00		96	31	60	10	20	29	25.54	29.83
19	FEW	100	10.00		87	28	56	12	14	29	25.59	29.88
22	CLR	NC	10.00		79	26	53	14	14	32	25.61	29.89
				SUNRISE: 0435 JUN 30 SUNSET: 1930								
01	CLR	NC	10.00		69	29	49	22	5	31	25.62	29.91
04	CLR	NC	10.00		64	28	47	26	3	31	25.61	29.91
07	CLR	NC	10.00		68	31	50	25	3	21	25.63	29.94
10	FEW	120	10.00		84	36	57	18	0	00	25.61	29.90
13	FEW	120	10.00		94	29	59	10	5	VR	25.54	29.82
16	FEW	100	10.00		97	24	59	7	15	29	25.49	29.76
19	FEW	200	10.00		88	27	56	11	14	32	25.50	29.79
22	CLR	NC	10.00		81	28	54	14	10	34	25.55	29.83

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	WIND DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	SEA LEVEL

3-HOURLY OBSERVATION NOTES

Sky Cover is the amount of the sky obscured. CLR or SKC = 0, FEW = 1/8-2/8, SCT = 3/8-4/8, BKN = 5/8-7/8, OVC = 8/8, W = Vertical Visibility = 8/8

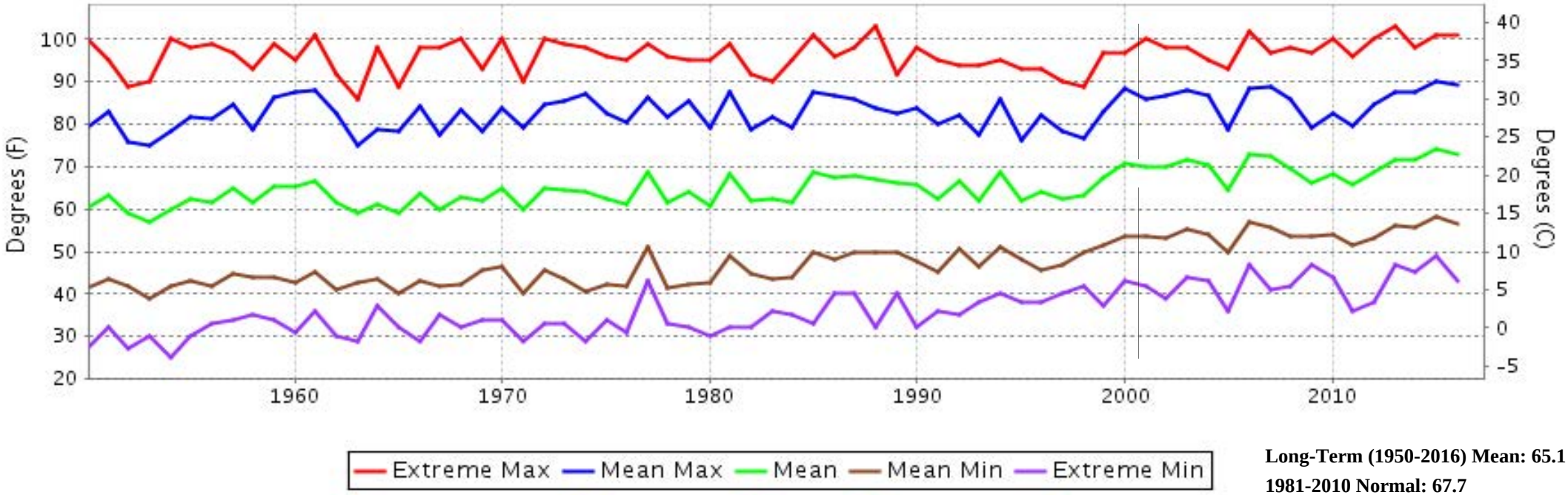
Ceiling is reported in hundreds of feet above ground level for clouds at or below 12,000 feet. NC = No Ceiling detected.

& = Original observation containted additional weather elements.
See page 3 for additional notes.

SUMMARY BY HOUR

HOUR (LST)	AVERAGES DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY	PRESSURE (Inches, HG) STATION	SEA LEVEL	VISIBILITY (Miles)	WIND SPEED (MPH)	RESULTANT WIND (MPH) SPEED	DIRECTION
01	64	35	49	35	25.60	29.92	10.00	5	3	25
02	62	35	48	38	25.61	29.93	10.00	4	3	25
03	61	35	48	40	25.61	29.93	10.00	5	2	24
04	59	35	47	42	25.61	29.94	10.00	4	3	25
05	58	35	46	43	25.62	29.96	10.00	4	2	24
06	61	35	48	40	25.63	29.96	10.00	3	2	21
07	65	35	50	35	25.63	29.97	10.00	3	2	23
08	69	34	51	28	25.63	29.96	10.00	3	2	16
09	74	33	53	23	25.62	29.95	10.00	4	2	15
10	78	31	54	19	25.61	29.93	10.00	5	2	18
11	82	28	54	15	25.60	29.92	10.00	8	4	25
12	85	27	55	13	25.59	29.90	10.00	10	3	26
13	86	27	55	13	25.58	29.89	10.00	11	5	26
14	87	26	56	13	25.57	29.88	10.00	12	8	26
15	87	27	56	12	25.56	29.87	10.00	13	10	26
16	86	28	56	13	25.55	29.87	10.00	14	11	27
17	84	27	55	14	25.55	29.87	10.00	16	12	27
18	82	29	55	16	25.55	29.88	10.00	15	12	27
19	79	31	54	19	25.57	29.89	10.00	13	10	27
20	76	32	53	22	25.58	29.90	10.00	11	8	26
21	73	33	53	25	25.60	29.92	10.00	9	6	26
22	71	35	52	28	25.60	29.92	10.00	8	5	26
23	69	34	51	29	25.61	29.92	10.00	5	3	26
24	67	34	50	31	25.60	29.92	10.00	4	2	24

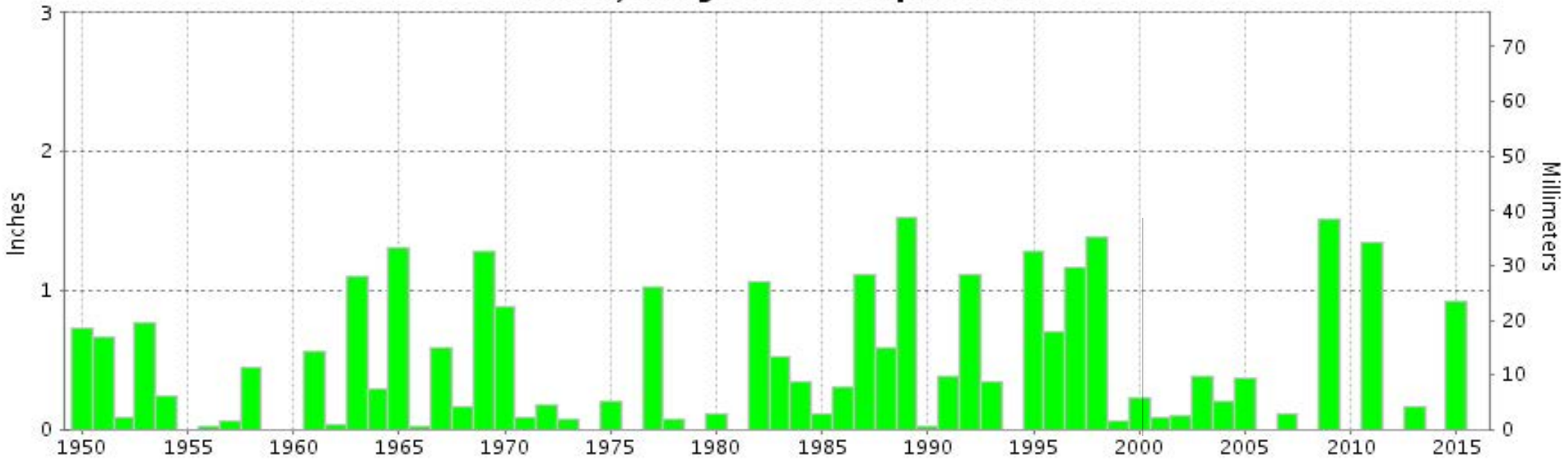
RENO, NV JUNE Temperatures



Long-Term (1950-2016) Mean: 65.1

1981-2010 Normal: 67.7

RENO, NV JUNE Precipitation



Long-Term (1950-2016) Mean Monthly Total: 0.43 **1981-2010 Normal: 0.51**

Published By: National Climatic Data Center

JUNE 2016
RENO, NV

LOCAL CLIMATOLOGICAL DATA

NOAA, National Climatic Data Center

I certify that this is an official publication of the National Oceanic and Atmospheric Administration (NOAA). It is compiled using information from weather observing sites operated by NOAA-National Weather Service / Department Of Transportation-Federal Aviation Administration and received at the National Climatic Data Center (NCDC), Asheville, North Carolina 28801.

DIRECTOR

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Fax Number : 828-271-4876
TDD : (828) 271-4010
or Email : ncdc.orders@noaa.gov

NOAA\National Climatic Data Center
Attn: User Engagement & Services Branch
151 Patton Avenue
Asheville, NC 28801-5001

JULY 2016
LOCAL CLIMATOLOGICAL DATA
NOAA, National Climatic Data Center

RENO, NV
RENO/TAHOE INTERNATIONAL AIRPORT (KRNO)
Lat:39° 29'N Long: 119° 46'W Elev (Ground) 4410 Feet
Time Zone : PACIFIC WBAN: 23185 ISSN#: 0198-3334

Date	Temperature °F						Deg Days BASE 65°		WEATHER	SNOW/ICE ON GND(IN)		PRECIPITATION ON GND(IN)		PRESSURE (INCHES OF HG)		WIND SPEED = MPH DIR = TENS OF DEGREES							Date
										0400 LST	1000 LST	2400 LST	2400 LST						MAXIMUM 3-SEC		MAXIMUM 2-MIN		
	MAXIMUM	MINIMUM	AVERAGE	DEP FROM NORMAL	AVERAGE DEW PT	AVERAGE WET BULB	HEATING	COOLING		DEPTH	WATER-EQUIV	SNOW-FALL	WATER EQUIV	AVERAGE STATION	AVERAGE SEA LEVEL	RESULTANT SPEED	RES DIR	AVERAGE SPEED	SPEED	DIR	SPEED	DIR	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
01	99	63	81	12	34	56	0	16		0		0.0	0.00	25.54	29.83	6.6	29	7.5	37	29	22	30	01
02	97	64	81	11	37	57	0	16		0		0.0	0.00	25.58	29.88	5.7	28	7.3	30	30	23	30	02
03	95	61	78	8	35	55	0	13		0		0.0	0.00	25.63	29.94	6.1	29	7.9	37	30	28	30	03
04	93	57	75	5	30	53	0	10		0		0.0	0.00	25.60	29.92	8.0	29	10.4	33	30	25	31	04
05	91	58	75	5	30	52	0	10		0		0.0	0.00	25.56	29.87	8.5	29	10.1	34	29	25	30	05
06	90	57	74	4	32	52	0	9		0		0.0	0.00	25.55	29.86	6.7	30	9.2	34	31	26	30	06
07	91	59	75	5	36	54	0	10		0		0.0	0.00	25.55	29.86	4.5	29	6.9	34	30	25	29	07
08	88	58	73	3	38	55	0	8		0		0.0	0.00	25.56	29.88	6.4	27	8.7	37	27	25	28	08
09	86	65	76	6	41	56	0	11		0		0.0	0.00	25.58	29.89	12.2	22	15.0	41*	22	31*	21	09
10	80	57	69	-2	27	49	0	4		0		0.0	0.00	25.57	29.91	10.4	30	11.9	30	30	23	30	10
11	86	50*	68*	-3	29	49	0	3		0		0.0	0.00	25.56	29.92	2.4	29	5.9	26	28	21	29	11
12	89	54	72	1	28	51	0	7		0		0.0	0.00	25.56	29.89	5.4	28	7.4	25	31	20	28	12
13	94	57	76	5	30	53	0	11		0		0.0	0.00	25.65	29.98	2.8	31	5.3	24	32	18	33	13
14	98	61	80	8	29	53	0	15		0		0.0	0.00	25.64	29.96	5.1	28	7.0	27	26	20	26	14
15	94	58	76	4	28	53	0	11		0		0.0	0.00	25.58	29.89	7.7	27	8.2	30	29	24	25	15
16	93	59	76	4	29	53	0	11		0		0.0	0.00	25.51	29.81	5.9	30	8.6	30	30	24	30	16
17	90	55	73	1	26	51	0	8		0		0.0	0.00	25.50	29.80	5.5	25	6.8	25	26	18	26	17
18	86	60	73	1	27	51	0	8		0		0.0	0.00	25.59	29.90	8.3	22	12.5	34	19	28	19	18
19	89	52	71	-1	30	51	0	6		0		0.0	0.00	25.62	29.96	5.3	25	7.8	30	18	25	18	19
20	93	55	74	2	31	52	0	9		0		0.0	0.00	25.64	29.97	4.3	27	6.2	37	25	24	19	20
21	96	56	76	4	29	52	0	11		0		0.0	0.00	25.66	29.99	4.5	23	7.6	31	20	25	20	21
22	94	55	75	3	24	51	0	10		0		0.0	0.00	25.70	30.04	7.8	30	8.7	35	29	24	35	22
23	93	57	75	3	25	51	0	10		0		0.0	0.00	25.64	29.97	1.7	35	4.4	20	02	17	01	23
24	97	58	78	6	30	54	0	13		0		0.0	0.00	25.58	29.88	3.3	29	5.1	28	30	23	30	24
25	97	57	77	5	30	54	0	12		0		0.0	0.00	25.63	29.94	4.3	30	6.3	27	31	21	27	25
26	101	59	80	8	29	54	0	15		0		0.0	0.00	25.63	29.94	5.0	28	5.9	32	28	18	30	26
27	103	59	81	9	32	56	0	16		0		0.0	0.00	25.62	29.92	3.5	30	5.1	30	30	22	28	27
28	102	67	85	13	42	60	0	20	TS	0		0.0	0.00	25.61	29.90	3.0	29	4.7	37	28	16	30	28
29	103*	70	87*	15	44	62	0	22	TS	0		0.0	0.00	25.56	29.82	4.6	30	7.3	30	28	23	31	29
30	99	67	83	11	42	59	0	18		0		0.0	0.00	25.52	29.79	6.8	28	8.2	32	28	24	28	30
31	98	63	81	9	39	57	0	16		0		0.0	0.00	25.55	29.83	6.4	29	8.6	32	17	24	29	31
	93.7	59.0	76.3	¤	32.0	53.7	0.0	11.6	< MONTHLY AVERAGES | TOTALS >			0.0	0.00	25.59	29.90	5.2	28	7.8	< MONTHLY AVERAGES				
	1.5	1.3	1.4		<---------- DEPARTURE FROM NORMAL ---------->								-0.18	SUNSHINE, CLOUD, & VISIBILITY TABLES ON PAGE 3									

DEGREE DAYS

	MONTHLY TOTAL	MONTHLY DEPARTURE	SEASON TO DATE TOTAL	SEASON TO DATE DEPARTURE
HEATING :	0	-5	0	-5
COOLING :	359	45	651	164

GREATEST 24-HR PRECIPITATION : 0.00 DATE :
GREATEST 24-HR SNOWFALL : 0.0 DATE :
GREATEST SNOW DEPTH : 0 DATE :

SEA LEVEL PRESSURE		DATE	TIME
MAXIMUM :	30.10	22	0758
MIMIMUM :	29.74	30	1555

NUMBER OF -> DAYS WITH

MAXIMUM TEMP >= 90 :	24	MINIMUM TEMP <= 32 :	0
MAXIMUM TEMP <= 32 :	0	MINIMUM TEMP <= 0 :	0
THUNDERSTORMS :	2	HEAVY FOG :	0

PRECIPITATION >= 0.01 INCH:	0
PRECIPITATION >= 0.10 INCH:	0
SNOWFALL >= 1.0 INCH :	0

JULY 2016
RENO, NV

HOURLY PRECIPITATION
(WATER EQUIVALENT IN INCHES)

RENO, NV (KRNO)
JULY 2016

WBAN # 23185

Date	FOR HOUR (LST) ENDING AT												Date	FOR HOUR (LST) ENDING AT												Date	Sum of Hourly Data	2400 LST Water Equiv.
	1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16	17	18	19	20	21	22	23	24			
01													01													01	0.00	0.00
02													02													02	0.00	0.00
03													03													03	0.00	0.00
04													04													04	0.00	0.00
05													05													05	0.00	0.00
06													06													06	0.00	0.00
07													07													07	0.00	0.00
08													08													08	0.00	0.00
09													09													09	0.00	0.00
10													10													10	0.00	0.00
11													11													11	0.00	0.00
12													12													12	0.00	0.00
13													13													13	0.00	0.00
14													14													14	0.00	0.00
15													15													15	0.00	0.00
16													16													16	0.00	0.00
17													17													17	0.00	0.00
18													18													18	0.00	0.00
19													19													19	0.00	0.00
20													20													20	0.00	0.00
21													21													21	0.00	0.00
22													22													22	0.00	0.00
23													23													23	0.00	0.00
24													24													24	0.00	0.00
25													25													25	0.00	0.00
26													26													26	0.00	0.00
27													27													27	0.00	0.00
28													28													28	0.00	0.00
29													29													29	0.00	0.00
30													30													30	0.00	0.00
31													31													31	0.00	0.00

*** Indicates sum of Hourly and Daily disagree.**

MAXIMUM SHORT DURATION PRECIPITATION (See Note)

Time Period (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (Inches)												
Ending Date												
Ending Time (Hr/Min)												

Date and time are not entered for TRACE amounts.

Note : The hourly and daily precipitation totals are printed in the last 2 columns and hi-lighted in red when they disagree. NWS does not edit ASOS hourly values but may edit daily and monthly totals. Hourly, daily, and monthly totals are printed as reported by the ASOS site.

REFERENCE NOTES & SUPPLEMENTAL SUMMARIES

*** = Extreme for the month (last occurence if more than one).**

T = Trace precipitation amount.

+ = also occurs on earlier date.

FG+ = Heavy fog, visibility .25 miles or less.

BLANK entries denote missing or unreported data.

Resultant wind is the vector sum of the wind speeds and directions divided by the number of observations.

Wind direction is recorded in tens of degrees (2 digits) clockwise from true north. '00' = calm, 'VR' = variable.

Precipitation is for the 24-hour period ending at the time indicated in the column heading.

Ceilometer (30-second) data are used to derive cloudiness at or below 12,000 feet. This cloudiness is the mean cloud cover detected during sunrise to sunset (SR-SS), or midnight to midnight (MN-MN).

WEATHER NOTATIONS

QUALIFIER	WEATHER PHENOMENA		
DESCRIPTOR	PRECIPITATION	OBSCURATION	OTHER
BC Patches	DZ Drizzle	BR Mist	DS Duststorm
BL Blowing	GR Hail	DU Widespread Dust	FC Funnel Cloud
DR Low Drifting	GS Small Hail and/or Snow Pellets	FG Fog	+FC Tornado Waterspout
FZ Freezing	IC Ice Crystals	FU Smoke	PO Well-Developed Dust/Sand Whirls
MI Shallow	PL Ice Pellets	HZ Haze	
PR Partial	RA Rain		
SH Shower(s)	SG Snow Grains	PY Spray	SQ Squalls
TS Thunderstorm	SN Snow	SA Sand	SS Sandstorm
VC In the Vicinity	UP Unkown Precipitation	VA Volcanic Ash	GL Glaze

Intensity (as indicated on pages 4 to 6):
'+' = Heavy ' ' = Moderate '-' = Light

RENO, NV
JULY 2016

Sky Condition is based on the sum (not to exceed 8) of the sunrise to sunset cloud cover below and above 12,000 feet.

Clear = 0-2 oktas, Partly Cloudy = 3-6 oktas, Cloudy = 7-8 oktas.

A Heating (Cooling) Degree Day is the difference between the average daily temperature and 65 degrees F. The HDD season begins July 1, the CDD season begins January 1.

Snow Depth, Snowfall, and Sunshine data may come from nearby sites that the National Weather Service deems Climatologically representative of this site.

NORMALS ARE FOR THE YEARS 1981-2010

ADDITIONAL NOTES & ERRATA:

Date	VISIBILITY (MILES) MINIMUM	VISIBILITY (MILES) MAXIMUM
01	10.00	10.00
02	8.00	10.00
03	8.00	10.00
04	10.00	10.00
05	10.00	10.00
06	10.00	10.00
07	10.00	10.00
08	10.00	10.00
09	10.00	10.00
10	10.00	10.00
11	10.00	10.00
12	10.00	10.00
13	10.00	10.00
14	10.00	10.00
15	10.00	10.00
16	10.00	10.00
17	10.00	10.00
18	10.00	10.00
19	10.00	10.00
20	10.00	10.00
21	10.00	10.00
22	10.00	10.00
23	10.00	10.00
24	10.00	10.00
25	8.00	10.00
26	10.00	10.00
27	10.00	10.00
28	10.00	10.00
29	10.00	10.00
30	10.00	10.00
31	9.00	10.00
AVGS	9.77	10.00

MINIMUM VISIBILTY (MILES)

<= .25	<= 3.0	>= 7.0
0	0	31

OBSERVATIONS AT 3-HOURLY INTERVALS

RENO, NV
JULY 2016 **KRNO** **WBAN # 23185**

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	SEA LEVEL
				SUNRISE: 0436 JUL 01 SUNSET: 1930								
01	FEW	120	10.00		73	29	51	19	5	31	25.55	29.83
04	CLR	NC	10.00		66	31	49	27	7	28	25.55	29.84
07	SCT	200	10.00		70	35	52	28	0	00	25.58	29.88
10	SCT	200	10.00		87	33	58	14	3	28	25.58	29.86
13	SCT	180	10.00		95	34	61	12	5	VR	25.53	29.80
16	SCT	180	10.00		96	31	60	10	17	30	25.48	29.76
19	SCT	200	10.00		86	38	59	18	21	29	25.52	29.81
22	FEW	120	10.00		80	37	56	21	10	28	25.57	29.85
				SUNRISE: 0436 JUL 02 SUNSET: 1930								
01	FEW	120	10.00		73	39	54	29	6	19	25.58	29.86
04	FEW	150	10.00		66	41	53	40	0	00	25.60	29.88
07	FEW	200	10.00		72	38	54	29	0	00	25.61	29.92
10	FEW	160	10.00		86	33	57	15	3	VR	25.61	29.89
13	SCT	150	10.00		92	37	61	14	6	VR	25.56	29.84
16	SCT	160	10.00		94	37	61	14	16	28	25.54	29.83
19	BKN	160	8.00		84	39	59	20	17	29	25.58	29.88
22	FEW	160	10.00		79	35	55	20	14	29	25.62	29.92
				SUNRISE: 0437 JUL 03 SUNSET: 1930								
01	CLR	NC	10.00		71	39	54	31	0	00	25.64	29.93
04	CLR	NC	10.00		63	39	50	41	3	17	25.65	29.96
07	CLR	NC	10.00		69	37	52	31	0	00	25.68	29.99
10	CLR	NC	10.00		84	32	56	15	0	00	25.66	29.96
13	CLR	NC	10.00		91	30	58	11	5	VR	25.61	29.91
16	CLR	NC	8.00		91	34	59	13	22	30	25.57	29.88
19	CLR	NC	10.00		82	34	56	18	25	29	25.58	29.89
22	CLR	NC	10.00		75	32	53	21	3	VR	25.65	29.95
				SUNRISE: 0437 JUL 04 SUNSET: 1930								
01	CLR	NC	10.00		71	30	50	22	9	28	25.63	29.93
04	CLR	NC	10.00		59	31	46	35	5	16	25.64	29.97
07	FEW	200	10.00		66	34	50	30	0	00	25.66	29.99
10	FEW	250	10.00		81	29	54	15	0	00	25.63	29.95
13	FEW	200	10.00		92	25	57	9	16	31	25.58	29.87
16	FEW	200	10.00		89	26	56	10	17	28	25.56	29.88
19	FEW	200	10.00		82	29	55	14	16	31	25.57	29.88
22	CLR	NC	10.00		75	31	52	20	18	30	25.59	29.89
				SUNRISE: 0438 JUL 05 SUNSET: 1930								
01	CLR	NC	10.00		70	32	51	25	3	26	25.61	29.90
04	CLR	NC	10.00		59	34	47	39	5	18	25.60	29.92
07	FEW	180	10.00		66	32	49	28	0	00	25.62	29.95
10	FEW	200	10.00		81	24	53	12	3	VR	25.60	29.90
13	FEW	200	10.00		90	21	56	8	20	29	25.53	29.83
16	FEW	200	10.00		89	29	57	11	20	30	25.51	29.81
19	FEW	250	10.00		80	32	55	17	25	30	25.51	29.82
22	FEW	200	10.00		73	33	52	23	14	32	25.56	29.86
				SUNRISE: 0438 JUL 06 SUNSET: 1929								
01	CLR	NC	10.00		69	32	50	25	9	33	25.57	29.87
04	CLR	NC	10.00		60	32	46	35	0	00	25.58	29.89
07	CLR	NC	10.00		67	33	50	28	0	00	25.59	29.91
10	CLR	NC	10.00		80	25	53	13	5	VR	25.57	29.88
13	FEW	200	10.00		88	26	56	10	10	32	25.52	29.80
16	FEW	200	10.00		87	35	58	16	18	29	25.50	29.80
19	SCT	250	10.00		79	34	55	20	18	29	25.52	29.82
22	CLR	NC	10.00		72	34	52	25	7	01	25.56	29.87

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	SEA LEVEL
				SUNRISE: 0439 JUL 07 SUNSET: 1929								
01	CLR	NC	10.00		66	36	50	33	5	05	25.56	29.87
04	FEW	120	10.00		61	35	48	38	0	00	25.59	29.91
07	CLR	NC	10.00		63	36	49	37	3	17	25.60	29.93
10	FEW	200	10.00		78	32	54	19	3	VR	25.57	29.88
13	FEW	200	10.00		88	35	59	15	7	21	25.53	29.82
16	CLR	NC	10.00		89	38	60	16	20	29	25.49	29.79
19	FEW	200	10.00		80	37	56	21	20	29	25.51	29.82
22	CLR	NC	10.00		73	37	54	27	0	00	25.55	29.85
				SUNRISE: 0440 JUL 08 SUNSET: 1929								
01	CLR	NC	10.00		68	37	52	32	3	05	25.56	29.86
04	FEW	120	10.00		60	38	49	44	5	18	25.58	29.89
07	FEW	200	10.00		68	37	52	32	0	00	25.59	29.91
10	BKN	250	10.00		79	33	55	19	6	12	25.58	29.89
13	BKN	210	10.00		85	39	59	20	14	27	25.54	29.84
16	BKN	230	10.00		85	40	59	20	25	28	25.53	29.83
19	BKN	250	10.00		79	41	58	26	14	27	25.57	29.88
22	SCT	210	10.00		72	40	54	31	6	30	25.59	29.90
				SUNRISE: 0440 JUL 09 SUNSET: 1928								
01	SCT	180	10.00		70	40	54	34	5	VR	25.60	29.90
04	FEW	080	10.00		67	41	53	39	8	19	25.61	29.92
07	FEW	150	10.00		72	41	55	33	3	VR	25.61	29.93
10	FEW	160	10.00		81	41	58	24	22	20	25.60	29.90
13	SCT	160	10.00		85	40	59	20	21	23	25.59	29.89
16	BKN	170	10.00		78	41	57	27	25	20	25.55	29.87
19	SCT	170	10.00		73	42	56	33	26	21	25.53	29.85
22	FEW	130	10.00		66	43	53	43	11	28	25.57	29.88
				SUNRISE: 0441 JUL 10 SUNSET: 1928								
01	FEW	130	10.00		64	37	50	37	7	33	25.55	29.86
04	CLR	NC	10.00		60	35	47	39	8	30	25.55	29.88
07	CLR	NC	10.00		65	29	48	26	14	30	25.58	29.91
10	CLR	NC	10.00		74	16	48	11	17	30	25.56	29.89
13	FEW	100	10.00		78	20	51	11	22	26	25.55	29.88
16	FEW	080	10.00		77	22	51	13	16	30	25.55	29.89
19	FEW	090	10.00		72	26	50	18	15	33	25.58	29.91
22	CLR	NC	10.00		63	30	47	29	9	01	25.62	29.97
				SUNRISE: 0441 JUL 11 SUNSET: 1928								
01	CLR	NC	10.00		57	31	45	37	5	31	25.64	29.99
04	CLR	NC	10.00		52	31	42	45	3	29	25.65	30.02
07	CLR	NC	10.00		57	32	45	39	0	00	25.65	30.02
10	CLR	NC	10.00		69	28	49	22	7	VR	25.61	29.97
13	CLR	NC	10.00		77	28	52	16	9	12	25.55	29.90
16	CLR	NC	10.00		83	27	54	13	3	VR	25.49	29.82
19	CLR	NC	10.00		79	25	52	14	13	29	25.49	29.82
22	CLR	NC	10.00		70	32	51	25	7	32	25.53	29.85
				SUNRISE: 0442 JUL 12 SUNSET: 1927								
01	CLR	NC	10.00		64	31	48	29	3	29	25.53	29.85
04	CLR	NC	10.00		54	33	44	45	3	19	25.53	29.87
07	CLR	NC	10.00		62	32	47	32	0	00	25.57	29.90
10	CLR	NC	10.00		77	24	51	14	7	07	25.57	29.88
13	CLR	NC	10.00		87	24	55	10	17	28	25.55	29.85
16	CLR	NC	10.00		87	23	55	9	16	27	25.54	29.86
19	CLR	NC	10.00		82	28	54	14	13	28	25.56	29.89
22	CLR	NC	10.00		72	33	52	24	0	00	25.62	29.95

OBSERVATIONS AT 3-HOURLY INTERVALS

RENO, NV
JULY 2016 **KRNO** **WBAN # 23185**

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	SEA LEVEL
				SUNRISE: 0443 JUL 13 SUNSET: 1927								
01	CLR	NC	10.00		64	31	48	29	6	28	25.65	29.96
04	CLR	NC	10.00		59	32	46	36	5	29	25.68	30.01
07	CLR	NC	10.00		63	34	48	34	0	00	25.70	30.04
10	CLR	NC	10.00		78	33	54	19	5	17	25.68	30.01
13	CLR	NC	10.00		89	28	57	11	8	06	25.65	29.96
16	CLR	NC	10.00		92	27	58	10	6	33	25.61	29.92
19	CLR	NC	10.00		89	28	57	11	13	32	25.61	29.92
22	CLR	NC	10.00		79	29	53	16	5	29	25.67	29.98
				SUNRISE: 0444 JUL 14 SUNSET: 1926								
01	CLR	NC	10.00		70	29	50	22	7	30	25.68	29.98
04	CLR	NC	10.00		63	32	48	31	3	30	25.69	30.00
07	CLR	NC	10.00		67	33	50	28	3	16	25.70	30.02
10	CLR	NC	10.00		82	22	53	11	3	VR	25.69	29.99
13	CLR	NC	10.00		94	20	57	7	7	02	25.62	29.92
16	CLR	NC	10.00		96	23	58	7	15	28	25.59	29.88
19	CLR	NC	10.00		87	26	56	11	11	28	25.61	29.91
22	CLR	NC	10.00		78	36	55	22	6	VR	25.64	29.94
				SUNRISE: 0444 JUL 15 SUNSET: 1926								
01	CLR	NC	10.00		66	35	50	32	0	00	25.64	29.94
04	FEW	180	10.00		62	29	46	29	5	30	25.63	29.94
07	BKN	240	10.00		65	30	48	27	0	00	25.65	29.97
10	BKN	250	10.00		80	32	55	17	5	VR	25.63	29.93
13	BKN	200	10.00		93	16	56	6	16	26	25.56	29.85
16	BKN	240	10.00		93	22	57	7	17	26	25.52	29.81
19	BKN	230	10.00		86	29	56	13	20	28	25.51	29.81
22	FEW	230	10.00		76	31	53	19	10	27	25.56	29.86
				SUNRISE: 0445 JUL 16 SUNSET: 1925								
01	FEW	230	10.00		72	31	51	22	6	29	25.55	29.83
04	CLR	NC	10.00		64	34	49	33	5	28	25.55	29.85
07	FEW	200	10.00		67	37	51	33	0	00	25.56	29.87
10	CLR	NC	10.00		83	28	55	13	3	VR	25.53	29.83
13	CLR	NC	10.00		89	25	56	10	5	VR	25.49	29.76
16	FEW	100	10.00		89	23	56	9	24	30	25.48	29.76
19	FEW	090	10.00		82	26	54	13	15	29	25.48	29.77
22	CLR	NC	10.00		74	31	52	20	6	26	25.52	29.80
				SUNRISE: 0446 JUL 17 SUNSET: 1925								
01	CLR	NC	10.00		64	30	47	28	5	18	25.52	29.81
04	CLR	NC	10.00		58	33	46	39	0	00	25.51	29.82
07	CLR	NC	10.00		64	34	49	33	0	00	25.53	29.83
10	CLR	NC	10.00		80	23	52	12	0	00	25.51	29.80
13	BKN	220	10.00		88	21	55	8	13	23	25.48	29.77
16	SCT	220	10.00		84	20	53	9	10	25	25.48	29.78
19	BKN	220	10.00		81	20	52	10	10	24	25.48	29.79
22	BKN	200	10.00		72	30	51	21	7	07	25.53	29.82
				SUNRISE: 0447 JUL 18 SUNSET: 1924								
01	FEW	240	10.00		70	27	49	20	22	19	25.54	29.84
04	FEW	160	10.00		63	27	46	26	6	32	25.56	29.88
07	CLR	NC	10.00		70	31	50	23	0	00	25.58	29.89
10	CLR	NC	10.00		81	25	53	13	18	21	25.60	29.90
13	FEW	110	10.00		86	27	55	12	22	18	25.59	29.89
16	CLR	NC	10.00		85	23	54	10	14	23	25.59	29.91
19	CLR	NC	10.00		76	29	52	18	13	29	25.59	29.91
22	CLR	NC	10.00		69	28	49	22	5	36	25.64	29.96

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	SEA LEVEL
				SUNRISE: 0447 JUL 19 SUNSET: 1923								
01	CLR	NC	10.00		61	30	46	31	3	20	25.65	29.98
04	CLR	NC	10.00		54	32	44	43	0	00	25.65	30.00
07	CLR	NC	10.00		60	34	47	38	0	00	25.67	30.02
10	CLR	NC	10.00		78	26	52	15	5	VR	25.64	29.97
13	SCT	250	10.00		88	26	56	10	18	18	25.61	29.93
16	SCT	250	10.00		85	28	55	13	16	26	25.58	29.91
19	FEW	250	10.00		78	33	54	19	20	29	25.57	29.91
22	CLR	NC	10.00		70	30	50	23	6	22	25.64	29.97
				SUNRISE: 0448 JUL 20 SUNSET: 1923								
01	CLR	NC	10.00		66	30	48	26	7	25	25.66	29.98
04	CLR	NC	10.00		60	33	47	36	3	VR	25.66	30.00
07	CLR	NC	10.00		64	32	48	30	0	00	25.69	30.04
10	CLR	NC	10.00		78	31	54	18	3	VR	25.69	30.02
13	FEW	110	10.00		89	26	56	10	10	27	25.62	29.93
16	CLR	NC	10.00		90	27	57	10	9	26	25.60	29.91
19	CLR	NC	10.00		82	32	55	16	16	29	25.61	29.93
22	CLR	NC	10.00		73	33	52	23	5	35	25.66	29.98
				SUNRISE: 0449 JUL 21 SUNSET: 1922								
01	CLR	NC	10.00		64	34	49	33	3	16	25.67	29.98
04	CLR	NC	10.00		59	35	47	41	0	00	25.68	30.01
07	FEW	200	10.00		64	34	49	33	0	00	25.70	30.04
10	CLR	NC	10.00		81	23	53	12	5	VR	25.68	30.00
13	FEW	180	10.00		95	22	58	7	23	21	25.63	29.93
16	SCT	220	10.00		91	26	57	9	20	20	25.63	29.95
19	SCT	170	10.00		83	29	55	14	16	28	25.66	29.98
22	FEW	170	10.00		73	28	51	19	6	07	25.69	30.01
				SUNRISE: 0450 JUL 22 SUNSET: 1921								
01	CLR	NC	10.00		64	30	47	28	0	00	25.70	30.02
04	CLR	NC	10.00		59	32	46	36	5	VR	25.72	30.06
07	CLR	NC	10.00		63	32	48	31	0	00	25.75	30.10
10	CLR	NC	10.00		81	22	52	11	0	00	25.74	30.07
13	CLR	NC	10.00		93	16	56	6	17	29	25.69	30.01
16	CLR	NC	10.00		92	17	56	6	17	29	25.66	29.98
19	CLR	NC	10.00		84	13	52	7	21	31	25.67	30.00
22	CLR	NC	10.00		75	29	52	18	9	29	25.71	30.03
				SUNRISE: 0451 JUL 23 SUNSET: 1921								
01	CLR	NC	10.00		65	26	47	23	3	27	25.72	30.04
04	CLR	NC	10.00		59	25	44	27	0	00	25.71	30.04
07	CLR	NC	10.00		63	27	46	26	0	00	25.73	30.07
10	CLR	NC	10.00		78	27	52	15	0	00	25.69	30.02
13	CLR	NC	10.00		91	21	56	8	8	35	25.63	29.94
16	CLR	NC	10.00		91	22	56	8	6	11	25.58	29.89
19	CLR	NC	10.00		88	23	55	9	14	01	25.56	29.87
22	CLR	NC	10.00		77	31	53	18	0	00	25.61	29.92
				SUNRISE: 0451 JUL 24 SUNSET: 1920								
01	CLR	NC	10.00		68	35	51	30	0	00	25.61	29.90
04	CLR	NC	10.00		63	34	48	34	0	00	25.61	29.93
07	CLR	NC	10.00		67	36	51	32	0	00	25.64	29.95
10	CLR	NC	10.00		85	28	55	13	3	VR	25.61	29.90
13	CLR	NC	10.00		93	17	56	6	5	VR	25.56	29.85
16	FEW	110	10.00		97	20	58	6	9	32	25.52	29.80
19	CLR	NC	10.00		87	35	58	16	17	29	25.55	29.85
22	CLR	NC	10.00		78	32	54	19	5	36	25.61	29.90

OBSERVATIONS AT 3-HOURLY INTERVALS

RENO, NV
JULY 2016 KRNO WBAN # 23185

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	WIND DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	SEA LEVEL
	SUNRISE: 0452		JUL 25		SUNSET: 1919							
01	CLR	NC	10.00		67	35	51	31	0	00	25.62	29.93
04	CLR	NC	10.00		58	33	46	39	5	20	25.65	29.96
07	CLR	NC	10.00		66	31	49	27	0	00	25.68	29.99
10	FEW	035	10.00		82	27	54	13	5	18	25.66	29.96
13	CLR	NC	10.00		93	19	56	7	6	35	25.61	29.91
16	CLR	NC	10.00		95	26	58	8	16	28	25.57	29.88
19	CLR	NC	9.00		87	33	58	14	13	29	25.60	29.91
22	CLR	NC	10.00		79	39	57	24	10	35	25.64	29.94
	SUNRISE: 0453		JUL 26		SUNSET: 1918							
01	CLR	NC	10.00		68	36	51	31	5	21	25.66	29.96
04	CLR	NC	10.00		62	34	48	35	3	25	25.67	29.98
07	FEW	060	10.00		68	35	51	30	5	30	25.69	30.01
10	SCT	100	10.00		81	35	56	19	0	00	25.67	29.98
13	CLR	NC	10.00		94	25	58	8	0	00	25.61	29.91
16	CLR	NC	10.00		100	16	58	5	18	30	25.56	29.85
19	CLR	NC	10.00		91	25	57	9	11	29	25.58	29.87
22	CLR	NC	10.00		81	31	55	16	9	28	25.63	29.93
	SUNRISE: 0454		JUL 27		SUNSET: 1917							
01	CLR	NC	10.00		67	30	49	25	0	00	25.64	29.94
04	CLR	NC	10.00		62	31	47	31	3	20	25.65	29.96
07	CLR	NC	10.00		66	32	49	28	0	00	25.68	29.99
10	CLR	NC	10.00		85	30	56	14	0	00	25.66	29.96
13	FEW	120	10.00		99	25	60	7	5	VR	25.61	29.89
16	FEW	110	10.00		102	31	62	8	14	29	25.56	29.85
19	FEW	100	10.00		93	37	61	14	11	29	25.60	29.89
22	CLR	NC	10.00		85	38	59	19	8	33	25.64	29.92
	SUNRISE: 0455		JUL 28		SUNSET: 1916							
01	CLR	NC	10.00		78	39	56	25	6	27	25.65	29.92
04	CLR	NC	10.00		70	41	54	35	3	22	25.66	29.94
07	FEW	140	10.00		72	42	55	34	0	00	25.68	29.98
10	FEW	200	10.00		91	37	60	15	3	VR	25.66	29.93
13	SCT	200	10.00		100	34	62	10	8	36	25.60	29.86
16	SCT	220	10.00		101	37	63	11	7	VR	25.54	29.81
19	BKN	250	10.00		91	46	64	21	10	27	25.57	29.85
22	SCT	200	10.00		83	52	64	34	11	29	25.60	29.87
	SUNRISE: 0456		JUL 29		SUNSET: 1916							
01	CLR	NC	10.00		79	49	61	35	6	29	25.61	29.86
04	CLR	NC	10.00		73	49	59	43	3	26	25.60	29.87
07	CLR	NC	10.00		77	49	60	37	3	32	25.61	29.90
10	FEW	110	10.00		92	47	64	21	3	VR	25.60	29.87
13	SCT	200	10.00		101	41	65	13	7	VR	25.53	29.79
16	BKN	180	10.00		102	41	65	12	17	28	25.49	29.75
19	SCT	180	10.00		93	42	63	17	14	29	25.51	29.78
22	CLR	NC	10.00		85	41	60	21	10	28	25.54	29.80
	SUNRISE: 0457		JUL 30		SUNSET: 1915							
01	CLR	NC	10.00		75	44	57	33	7	20	25.54	29.81
04	CLR	NC	10.00		71	44	56	38	0	00	25.53	29.80
07	BKN	200	10.00		75	45	58	34	3	30	25.56	29.84
10	SCT	200	10.00		89	41	61	19	0	00	25.55	29.81
13	SCT	200	10.00		97	41	63	14	17	27	25.49	29.75
16	FEW	110	10.00		95	39	62	14	18	27	25.48	29.74
19	CLR	NC	10.00		87	41	60	20	17	30	25.49	29.76
22	CLR	NC	10.00		81	42	59	25	5	25	25.54	29.81

HOUR (LST)	SKY COVER	CEILING 100's of FT.	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)	WIND SPEED (MPH)	WIND DIRECTION Tens of Deg	PRESSURE (INCHES, HG) STATION	SEA LEVEL
	SUNRISE: 0458		JUL 31		SUNSET: 1914							
01	CLR	NC	10.00		69	43	55	39	0	00	25.53	29.81
04	CLR	NC	10.00		66	44	54	45	3	20	25.54	29.83
07	SCT	090	10.00		70	45	56	41	0	00	25.57	29.87
10	SCT	070	10.00		87	43	61	21	0	00	25.57	29.85
13	SCT	060	10.00		95	38	62	14	18	30	25.53	29.80
16	CLR	NC	10.00		93	33	60	12	20	29	25.50	29.78
19	CLR	NC	10.00		85	35	57	17	16	29	25.53	29.81
22	CLR	NC	10.00		78	38	56	24	0	00	25.58	29.86

3-HOURLY OBSERVATION NOTES

Sky Cover is the amount of the sky obscured. CLR or SKC = 0, FEW = 1/8-2/8, SCT = 3/8-4/8, BKN = 5/8-7/8, OVC = 8/8, W = Vertical Visibility = 8/8

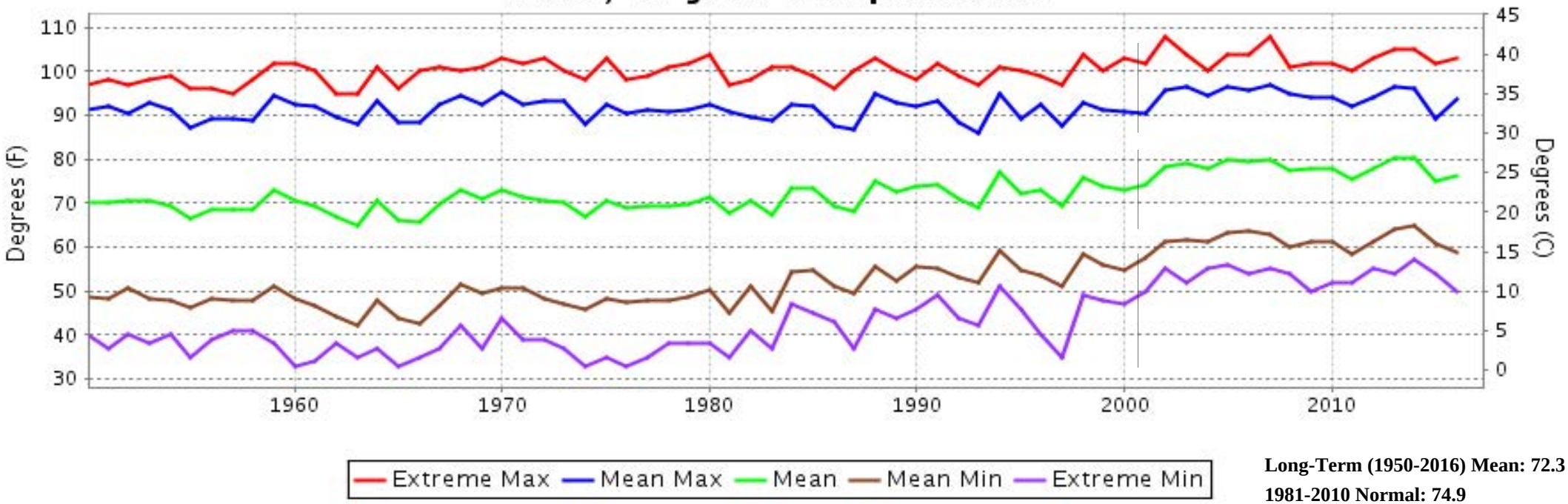
Ceiling is reported in hundreds of feet above ground level for clouds at or below 12,000 feet. NC = No Ceiling detected.

& = Original observation containted additional weather elements.
See page 3 for additional notes.

SUMMARY BY HOUR

HOUR (LST)	AVERAGES DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY	PRESSURE (Inches, HG) STATION	SEA LEVEL	VISIBILITY (Miles)	WIND SPEED (MPH)	RESULTANT WIND (MPH) SPEED	DIRECTION
01	68	34	51	29	25.61	29.91	10.00	5	3	29
02	65	34	50	32	25.61	29.91	10.00	4	3	30
03	63	34	49	35	25.61	29.92	10.00	4	2	31
04	62	35	48	37	25.62	29.93	10.00	3	3	30
05	60	35	48	39	25.63	29.94	10.00	3	3	30
06	63	35	49	36	25.63	29.95	10.00	2	5	32
07	67	35	51	31	25.64	29.96	10.00	1	5	33
08	72	34	52	26	25.64	29.95	10.00	2	4	33
09	77	33	54	20	25.63	29.94	10.00	3	4	33
10	82	30	55	16	25.62	29.92	10.00	4	4	33
11	85	29	56	13	25.61	29.91	9.94	6	2	02
12	88	28	57	12	25.59	29.89	9.97	8	4	29
13	91	27	58	11	25.57	29.87	10.00	12	8	28
14	91	28	58	10	25.56	29.86	10.00	12	11	28
15	92	28	58	11	25.55	29.85	10.00	15	12	28
16	91	29	58	11	25.54	29.84	9.94	16	13	27
17	89	30	58	12	25.54	29.85	9.94	16	14	27
18	87	31	57	14	25.55	29.85	10.00	17	14	27
19	83	32	56	16	25.56	29.86	9.90	16	13	27
20	80	33	55	19	25.57	29.88	9.97	13	10	28
21	78	34	54	21	25.59	29.90	10.00	10	8	28
22	75	34	54	23	25.60	29.90	10.00	7	5	28
23	73	34	53	24	25.61	29.91	10.00	5	3	29
24	71	34	52	26	25.61	29.91	10.00	5	4	29

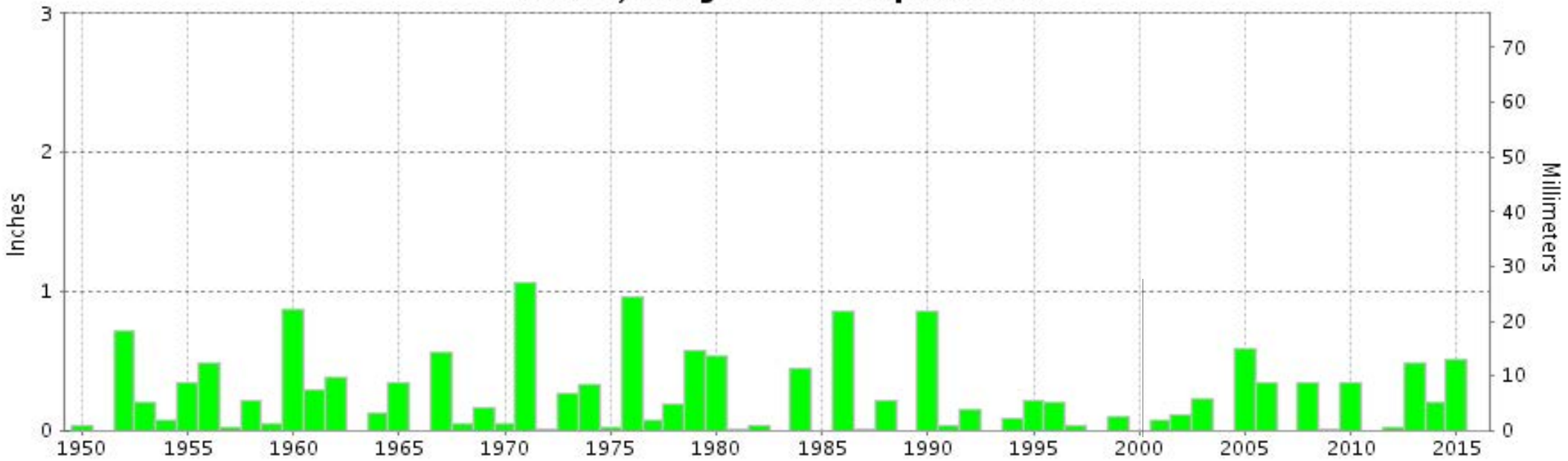
RENO, NV JULY Temperatures



Long-Term (1950-2016) Mean: 72.3

1981-2010 Normal: 74.9

RENO, NV JULY Precipitation



Long-Term (1950-2016) Mean Monthly Total: 0.23 **1981-2010 Normal: 0.18**

Published By: National Climatic Data Center

JULY 2016
RENO, NV

LOCAL CLIMATOLOGICAL DATA

NOAA, National Climatic Data Center

I certify that this is an official publication of the National Oceanic and Atmospheric Administration (NOAA). It is compiled using information from weather observing sites operated by NOAA-National Weather Service / Department Of Transportation-Federal Aviation Administration and received at the National Climatic Data Center (NCDC), Asheville, North Carolina 28801.

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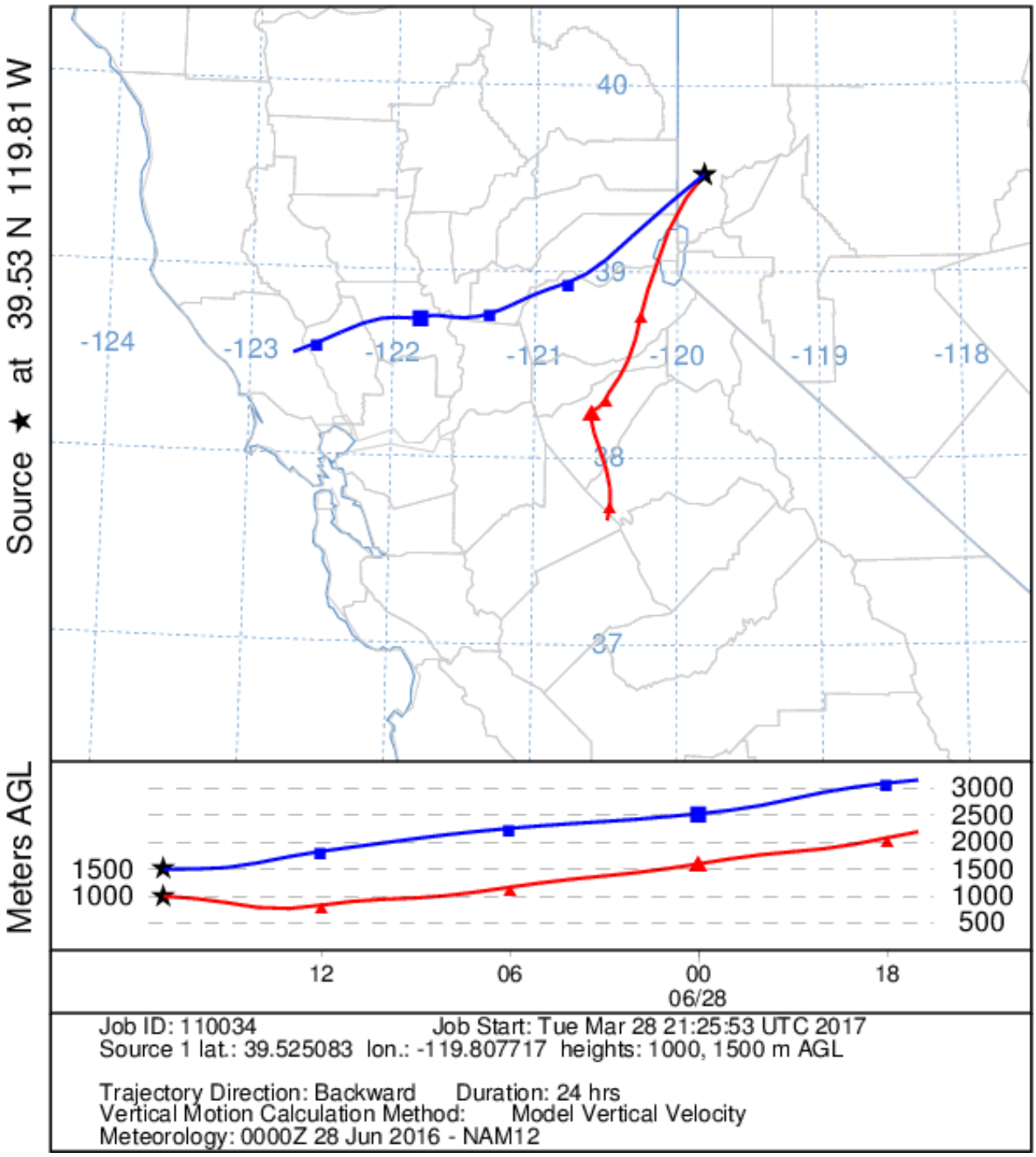
or Email : ncdc.orders@noaa.gov

NOAA\National Climatic Data Center
Attn: User Engagement & Services Branch
151 Patton Avenue
Asheville, NC 28801-5001

APPENDIX F

HYSPLIT TRAJECTORIES

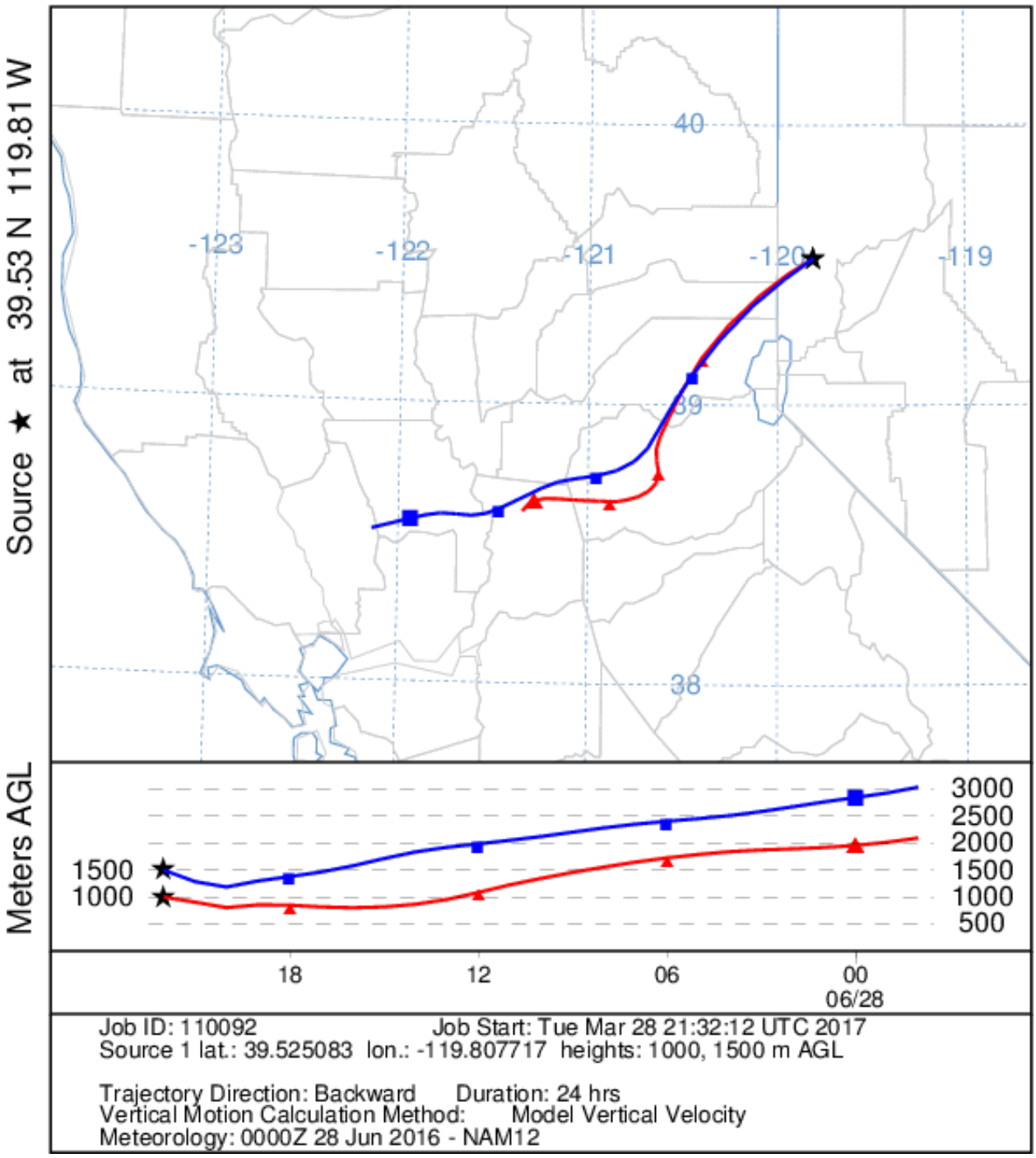
NOAA HYSPLIT MODEL
Backward trajectories ending at 1700 UTC 28 Jun 16
NAM Meteorological Data



Job ID: 110034 Job Start: Tue Mar 28 21:25:53 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 28 Jun 2016 - NAM12

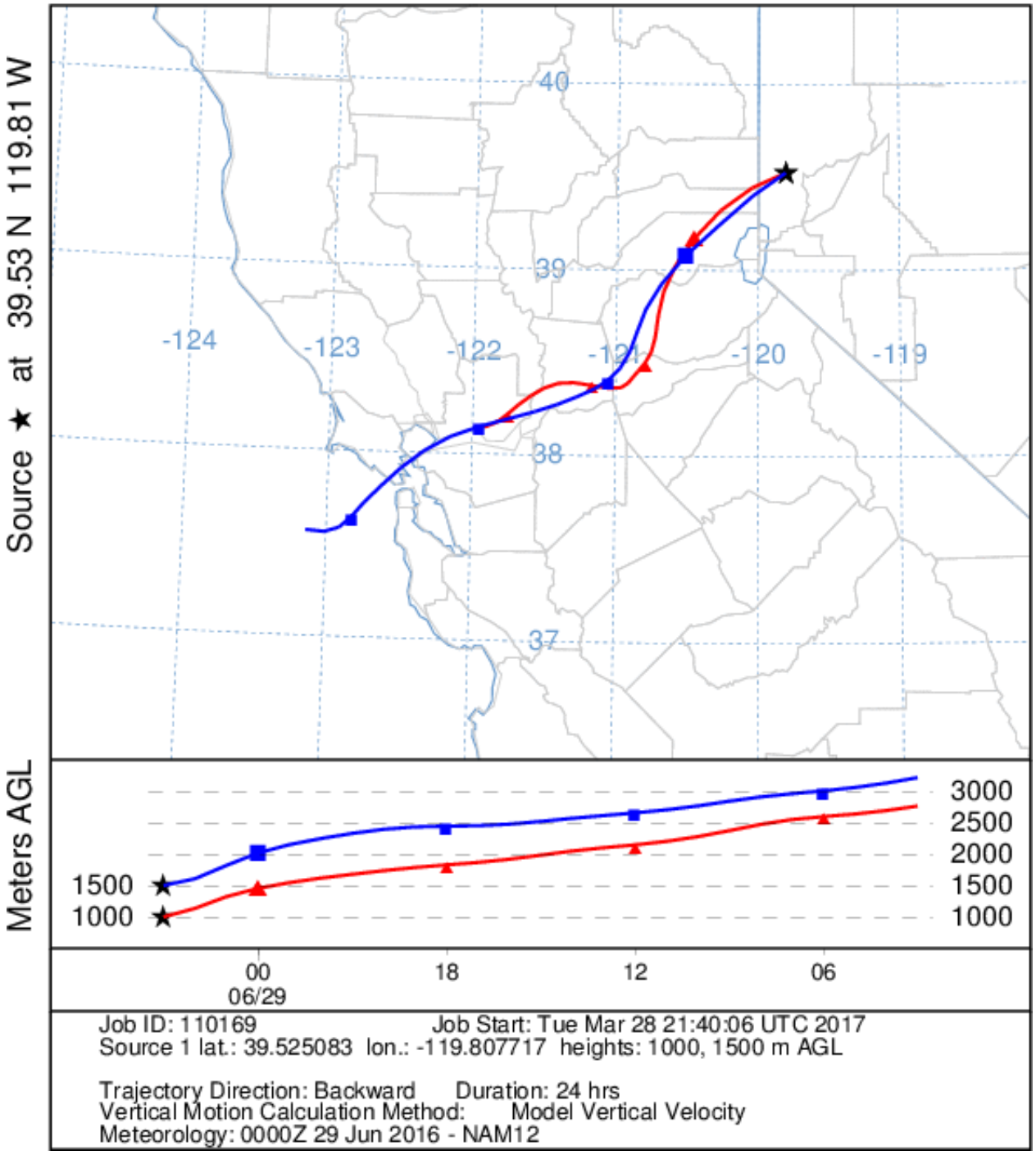
NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 28 Jun 16
NAM Meteorological Data



Job ID: 110092 Job Start: Tue Mar 28 21:32:12 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 28 Jun 2016 - NAM12

NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 29 Jun 16
NAM Meteorological Data



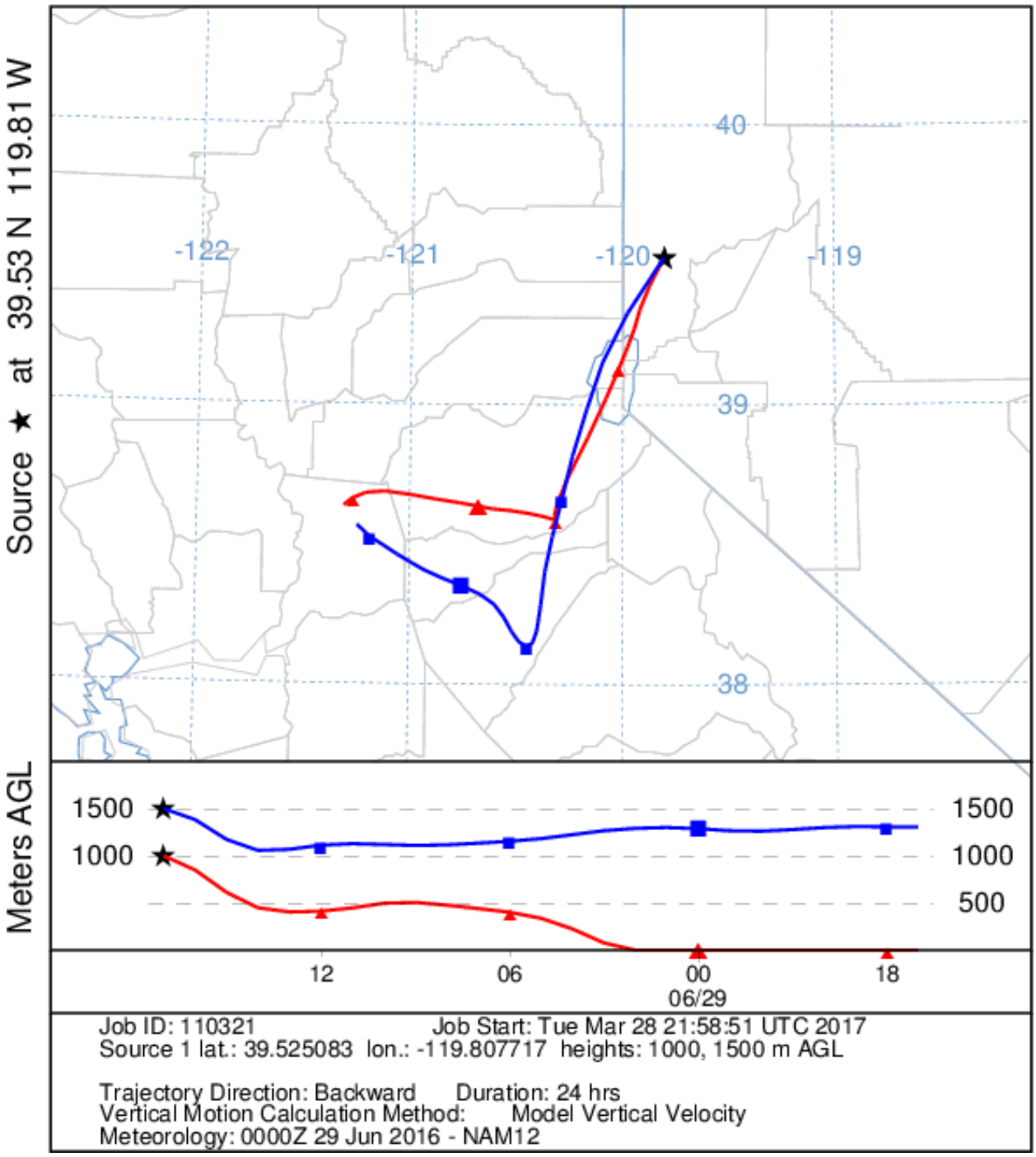
Job ID: 110169 Job Start: Tue Mar 28 21:40:06 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 29 Jun 2016 - NAM12

NOAA HYSPLIT MODEL

Backward trajectories ending at 1700 UTC 29 Jun 16

NAM Meteorological Data



Job ID: 110321 Job Start: Tue Mar 28 21:58:51 UTC 2017

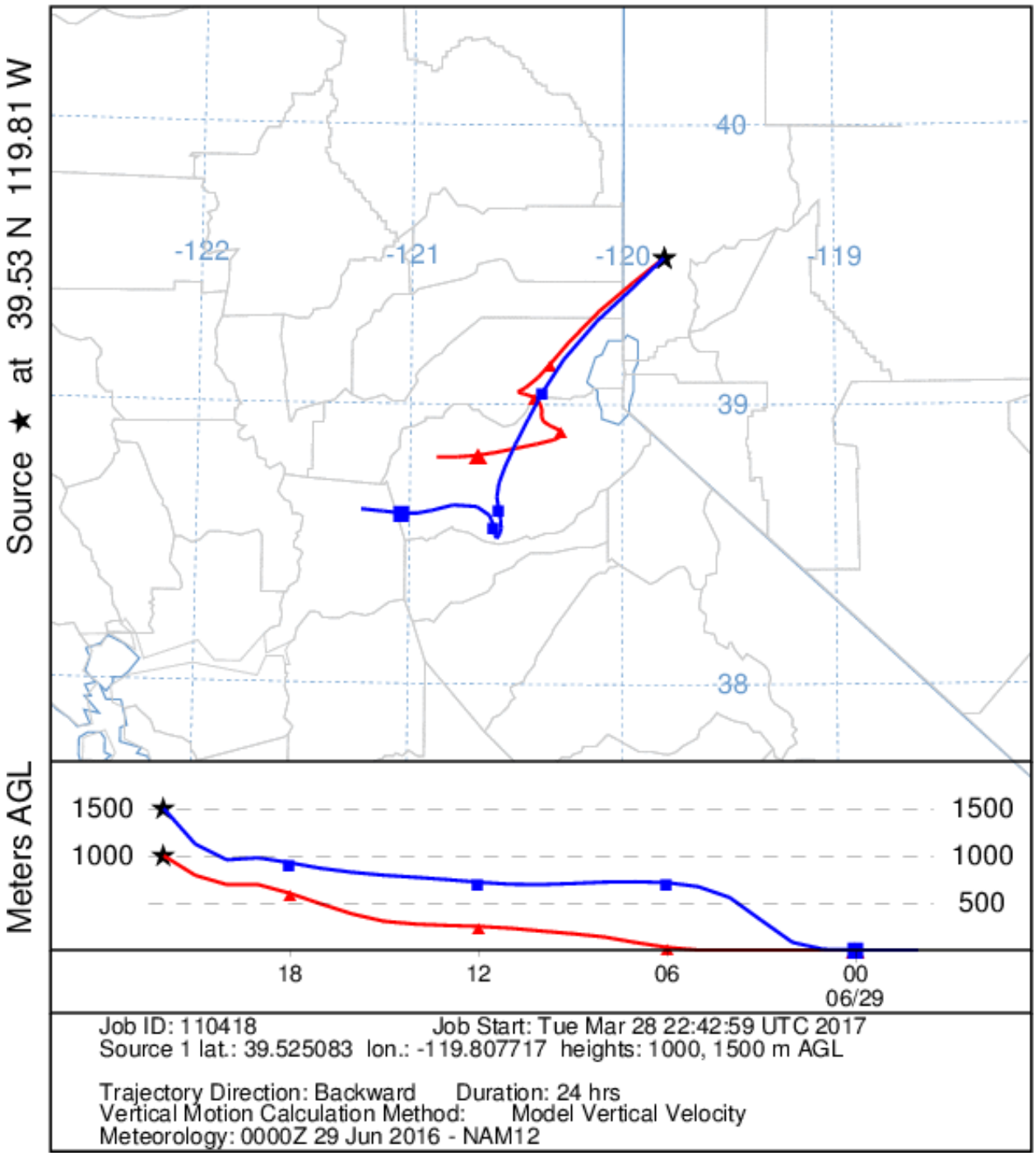
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs

Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 29 Jun 2016 - NAM12

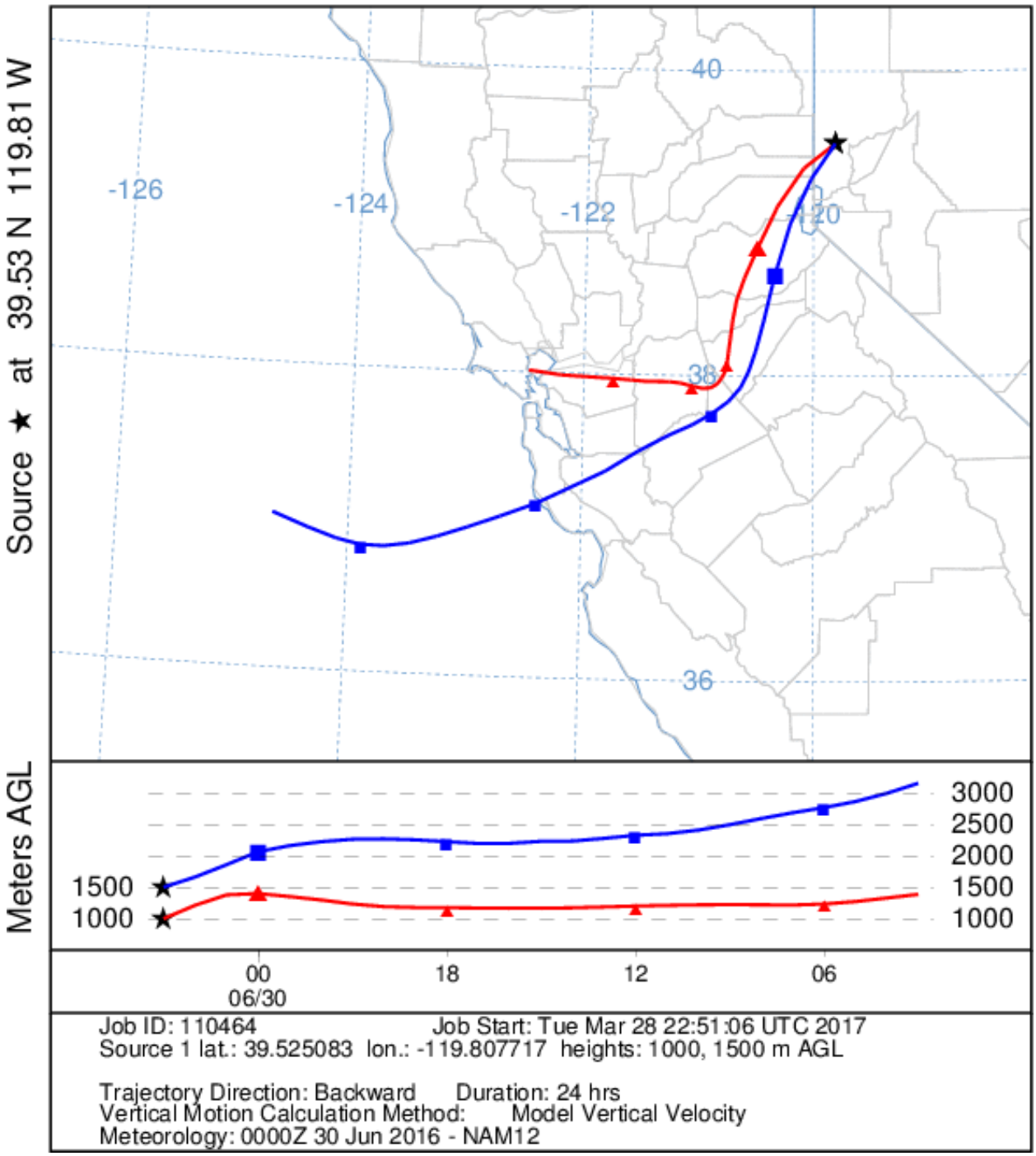
NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 29 Jun 16
NAM Meteorological Data



Job ID: 110418 Job Start: Tue Mar 28 22:42:59 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 29 Jun 2016 - NAM12

NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 30 Jun 16
NAM Meteorological Data



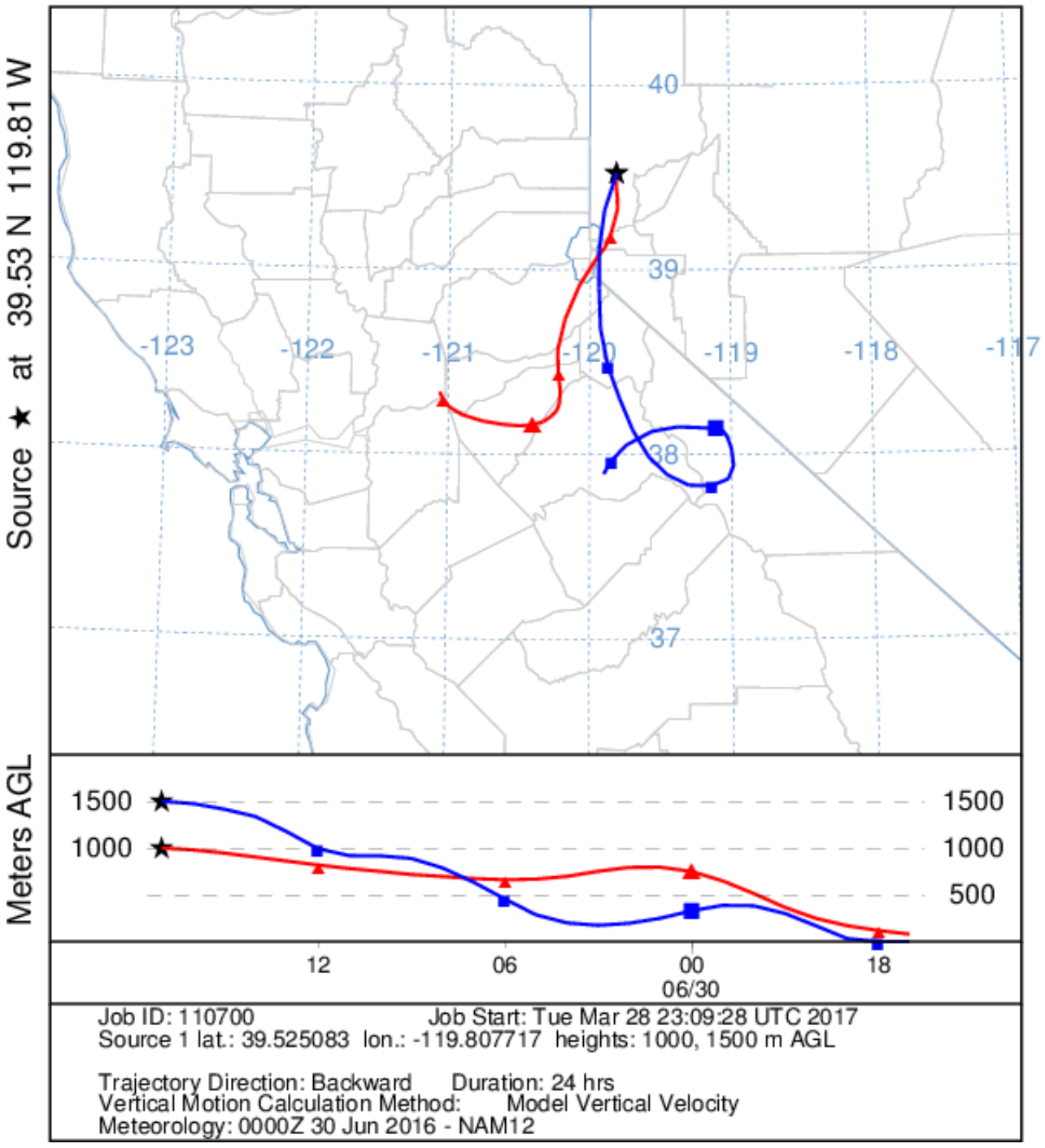
Job ID: 110464 Job Start: Tue Mar 28 22:51:06 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 30 Jun 2016 - NAM12

NOAA HYSPLIT MODEL

Backward trajectories ending at 1700 UTC 30 Jun 16

NAM Meteorological Data



Job ID: 110700 Job Start: Tue Mar 28 23:09:28 UTC 2017

Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs

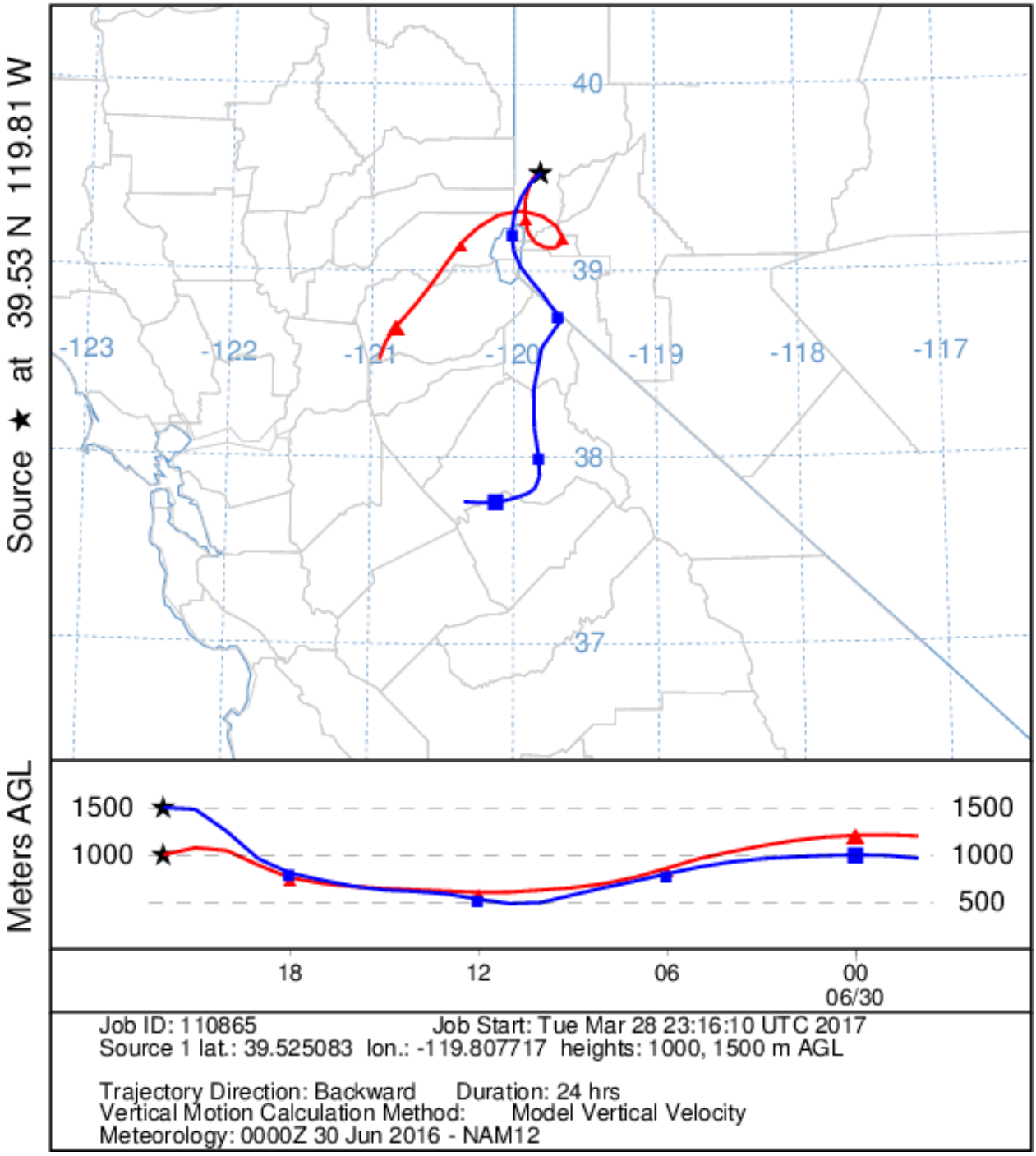
Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 30 Jun 2016 - NAM12

NOAA HYSPLIT MODEL

Backward trajectories ending at 2200 UTC 30 Jun 16

NAM Meteorological Data



Job ID: 110865 Job Start: Tue Mar 28 23:16:10 UTC 2017

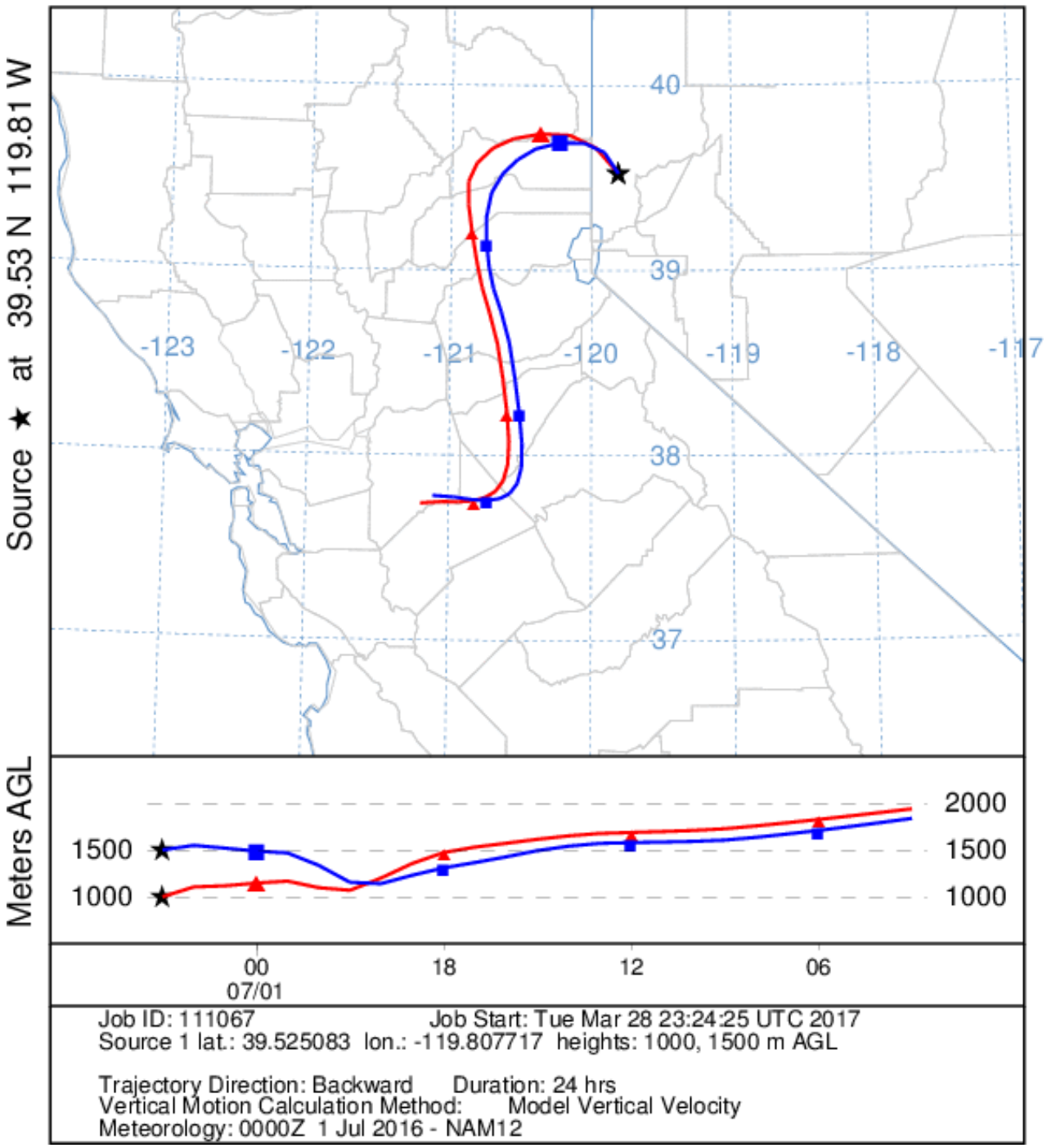
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs

Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 30 Jun 2016 - NAM12

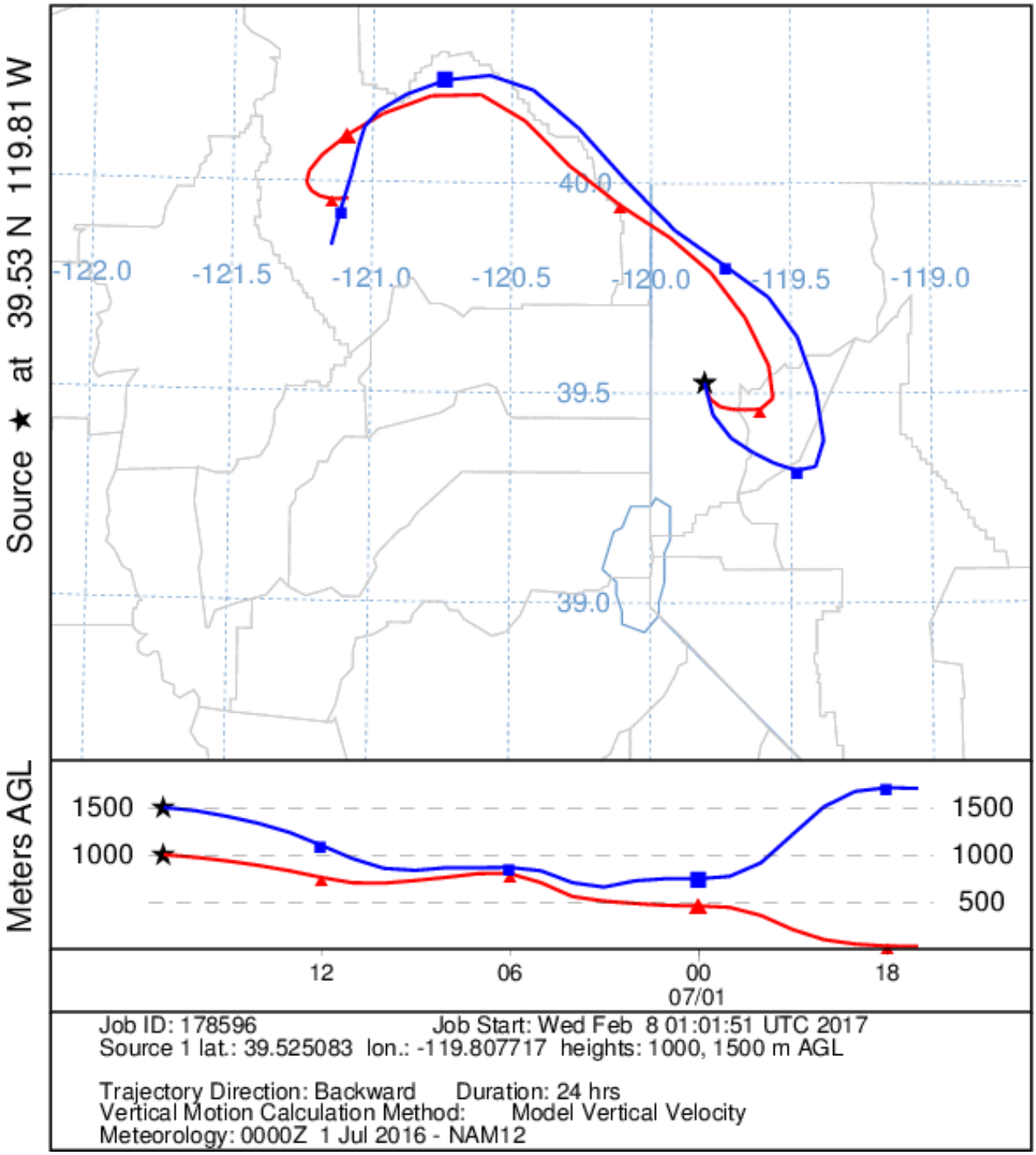
NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 01 Jul 16
NAM Meteorological Data



Job ID: 111067 Job Start: Tue Mar 28 23:24:25 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Jul 2016 - NAM12

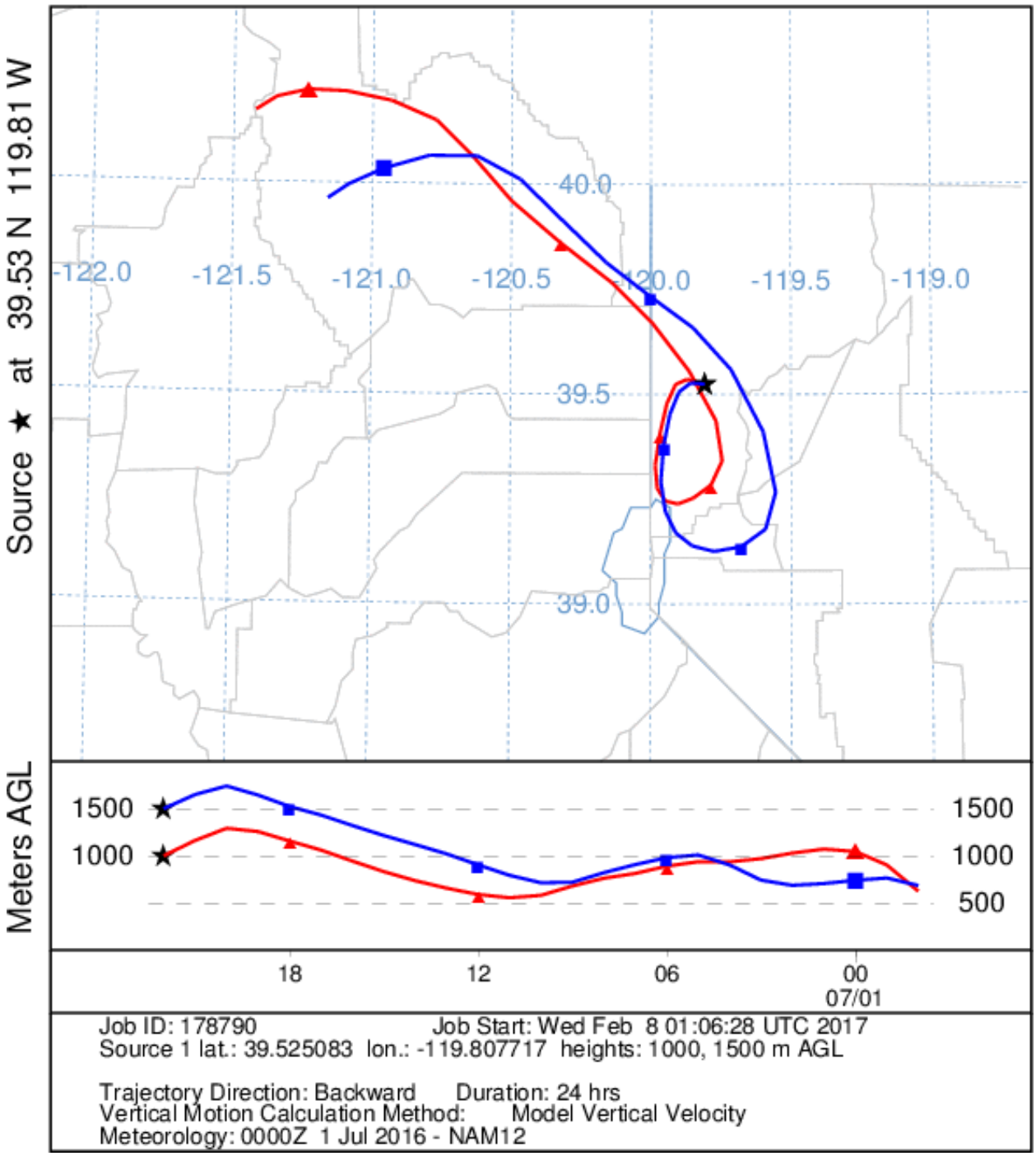
NOAA HYSPLIT MODEL
Backward trajectories ending at 1700 UTC 01 Jul 16
NAM Meteorological Data



Job ID: 178596 Job Start: Wed Feb 8 01:01:51 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Jul 2016 - NAM12

NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 01 Jul 16
NAM Meteorological Data



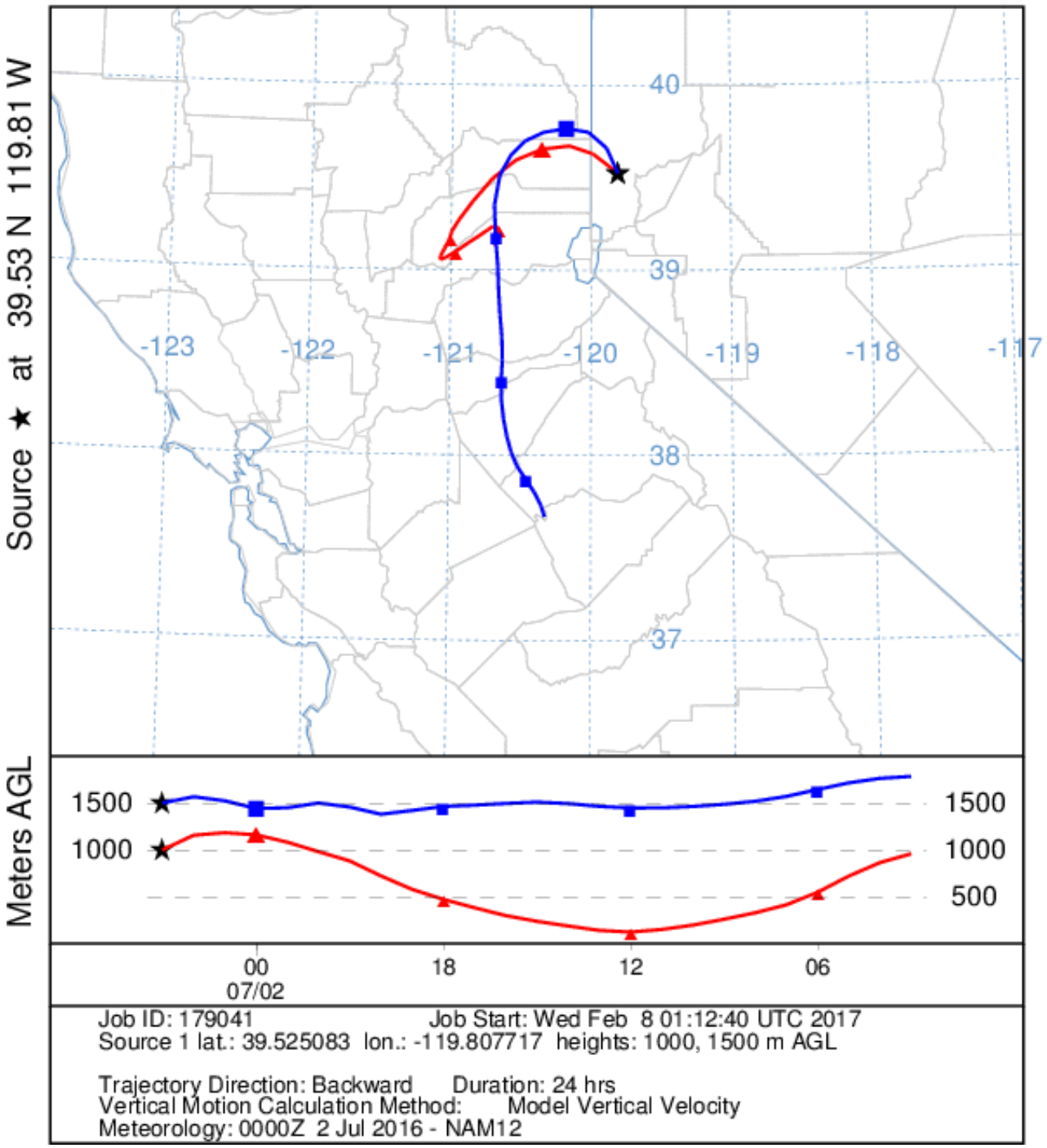
Job ID: 178790 Job Start: Wed Feb 8 01:06:28 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Jul 2016 - NAM12

NOAA HYSPLIT MODEL

Backward trajectories ending at 0300 UTC 02 Jul 16

NAM Meteorological Data



Job ID: 179041 Job Start: Wed Feb 8 01:12:40 UTC 2017

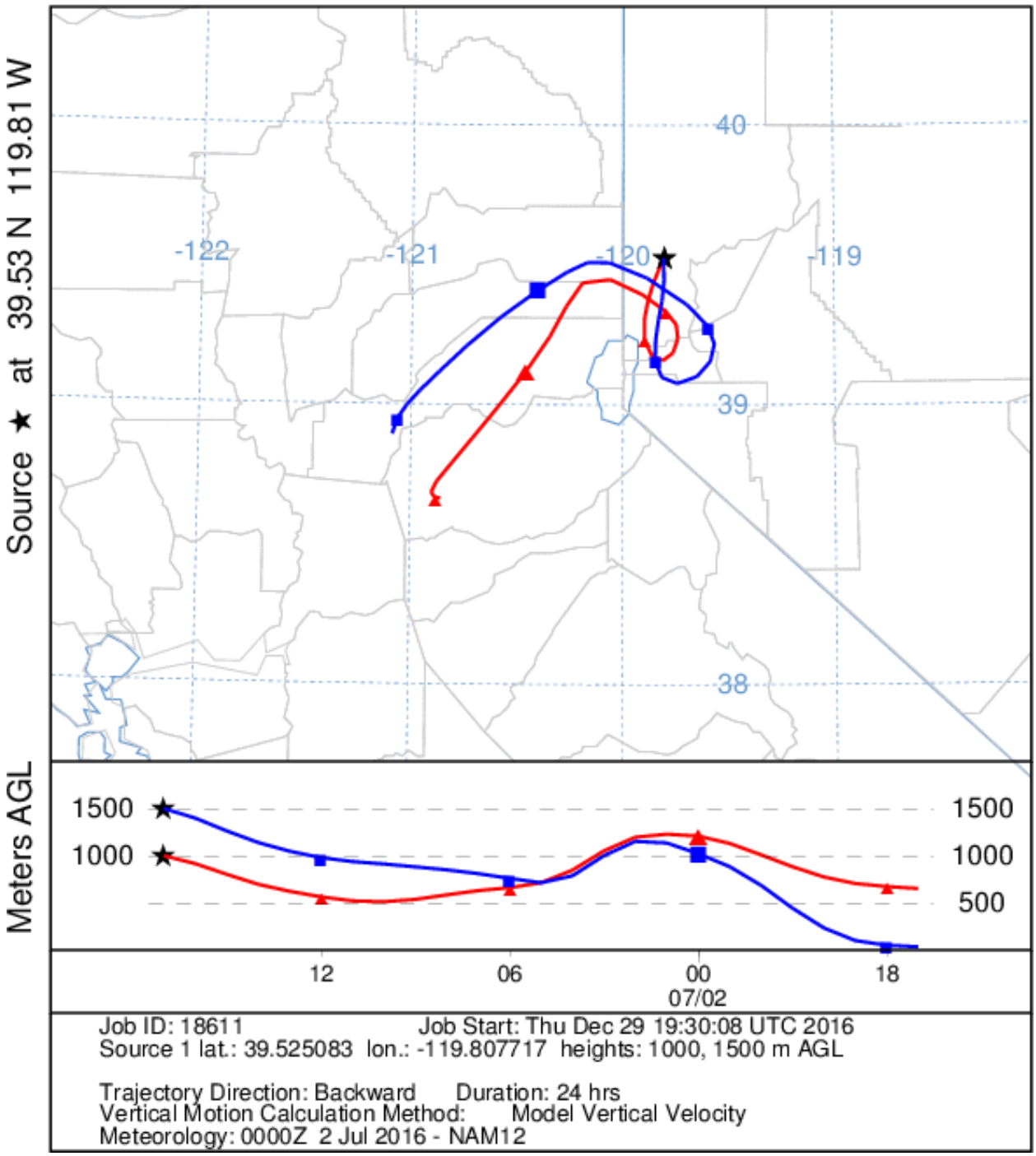
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs

Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 2 Jul 2016 - NAM12

NOAA HYSPLIT MODEL
Backward trajectories ending at 1700 UTC 02 Jul 16
NAM Meteorological Data



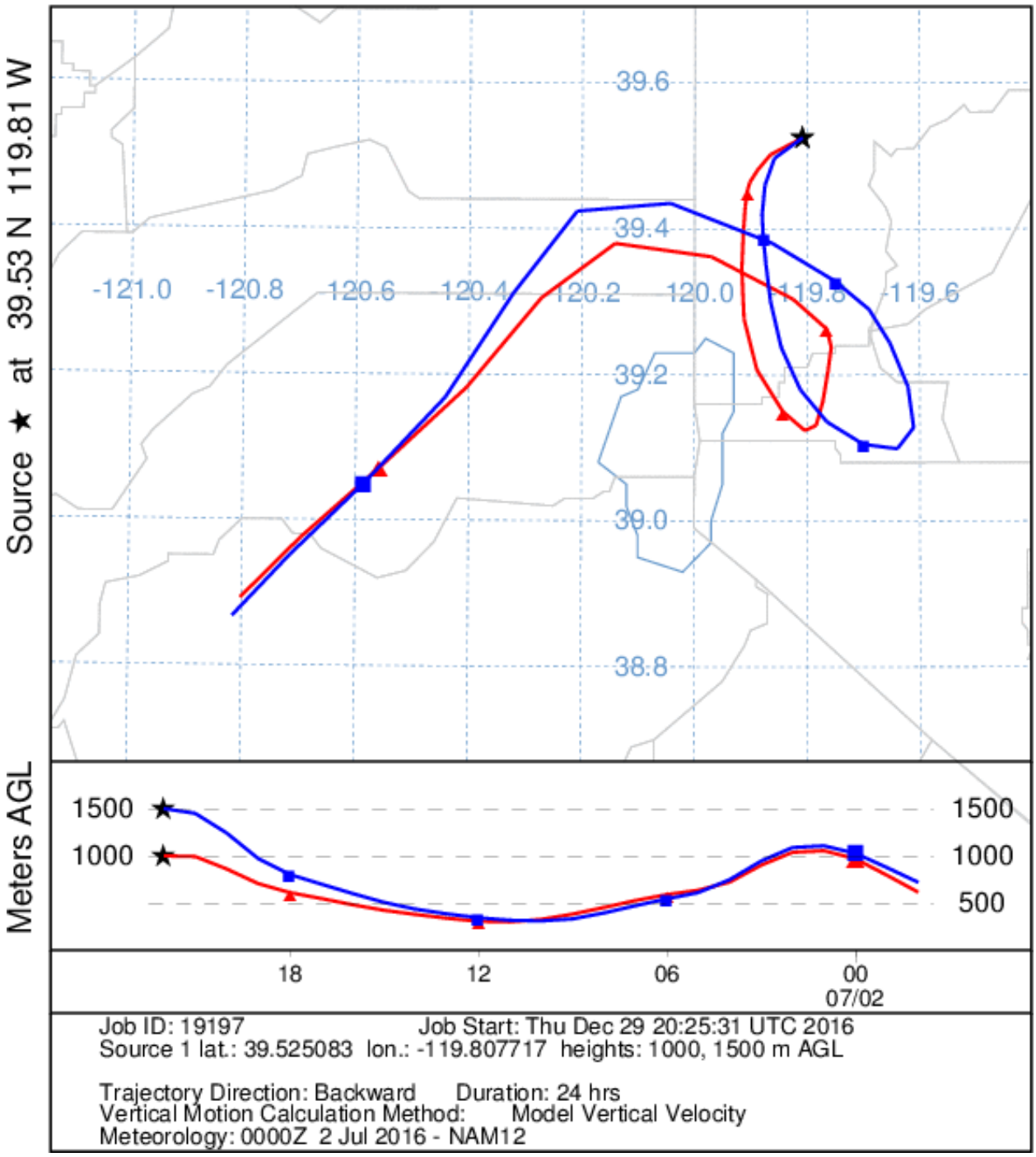
Job ID: 18611 Job Start: Thu Dec 29 19:30:08 UTC 2016
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 2 Jul 2016 - NAM12

NOAA HYSPLIT MODEL

Backward trajectories ending at 2200 UTC 02 Jul 16

NAM Meteorological Data



Job ID: 19197 Job Start: Thu Dec 29 20:25:31 UTC 2016

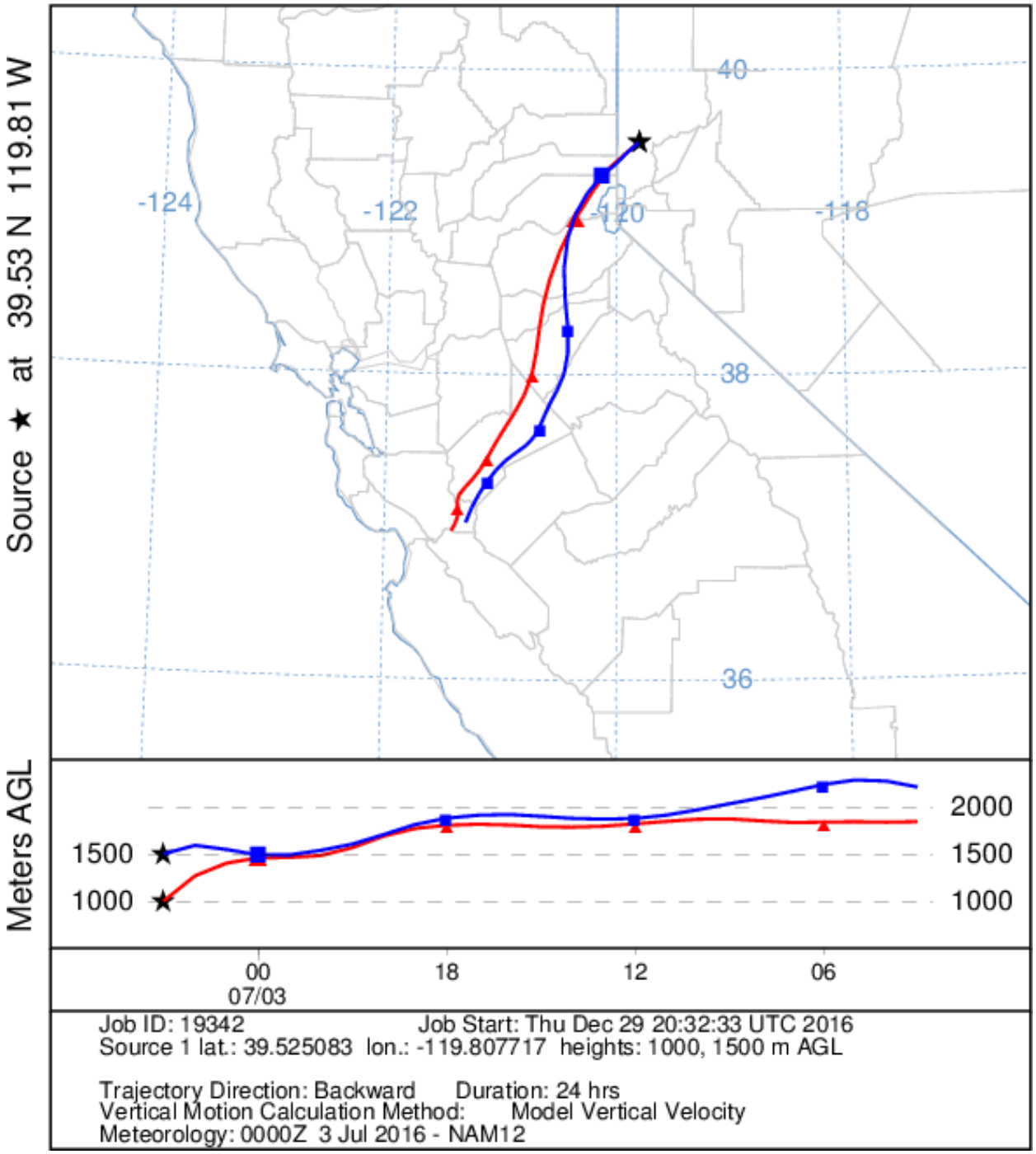
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs

Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 2 Jul 2016 - NAM12

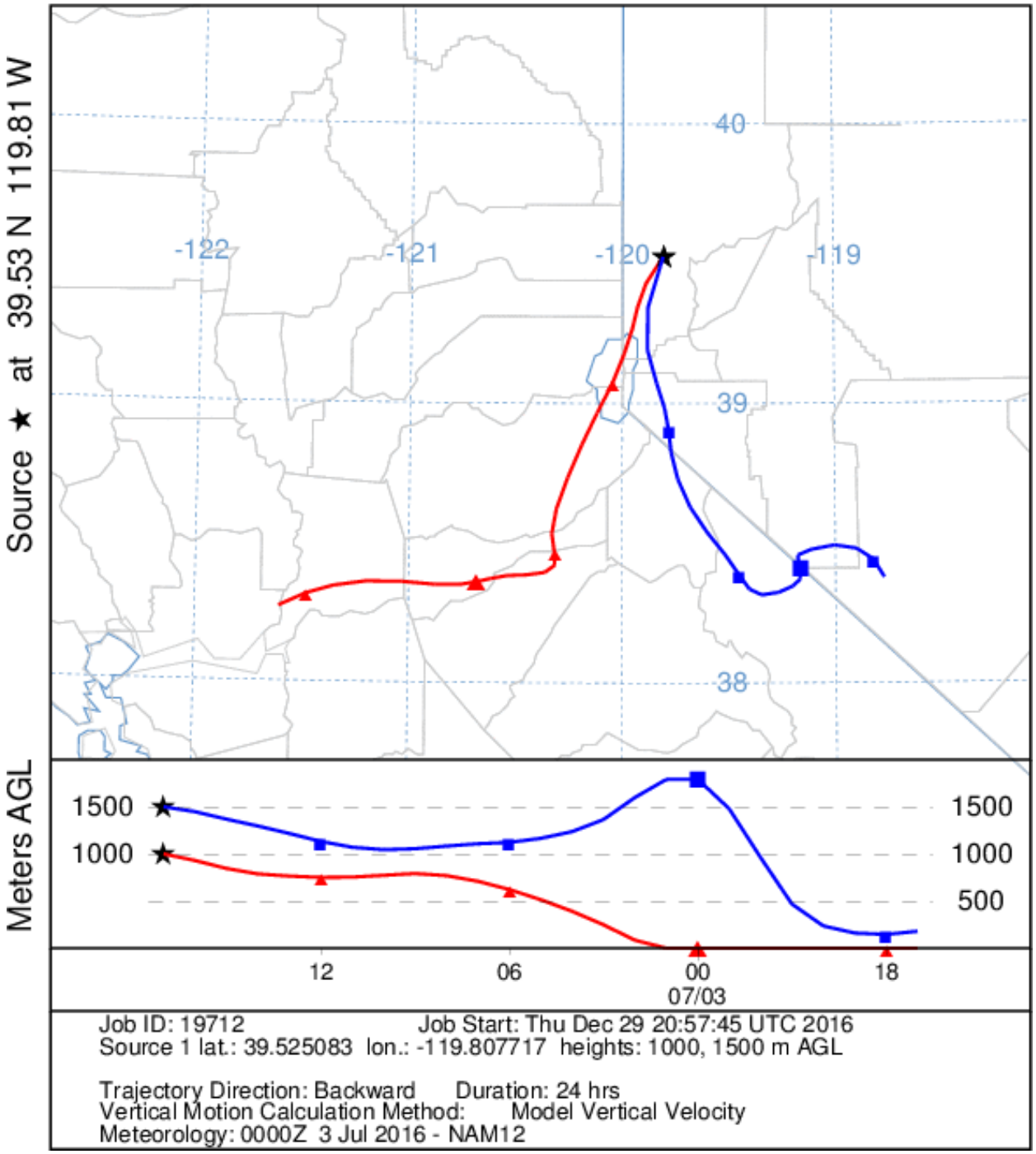
NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 03 Jul 16
NAM Meteorological Data



Job ID: 19342 Job Start: Thu Dec 29 20:32:33 UTC 2016
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 3 Jul 2016 - NAM12

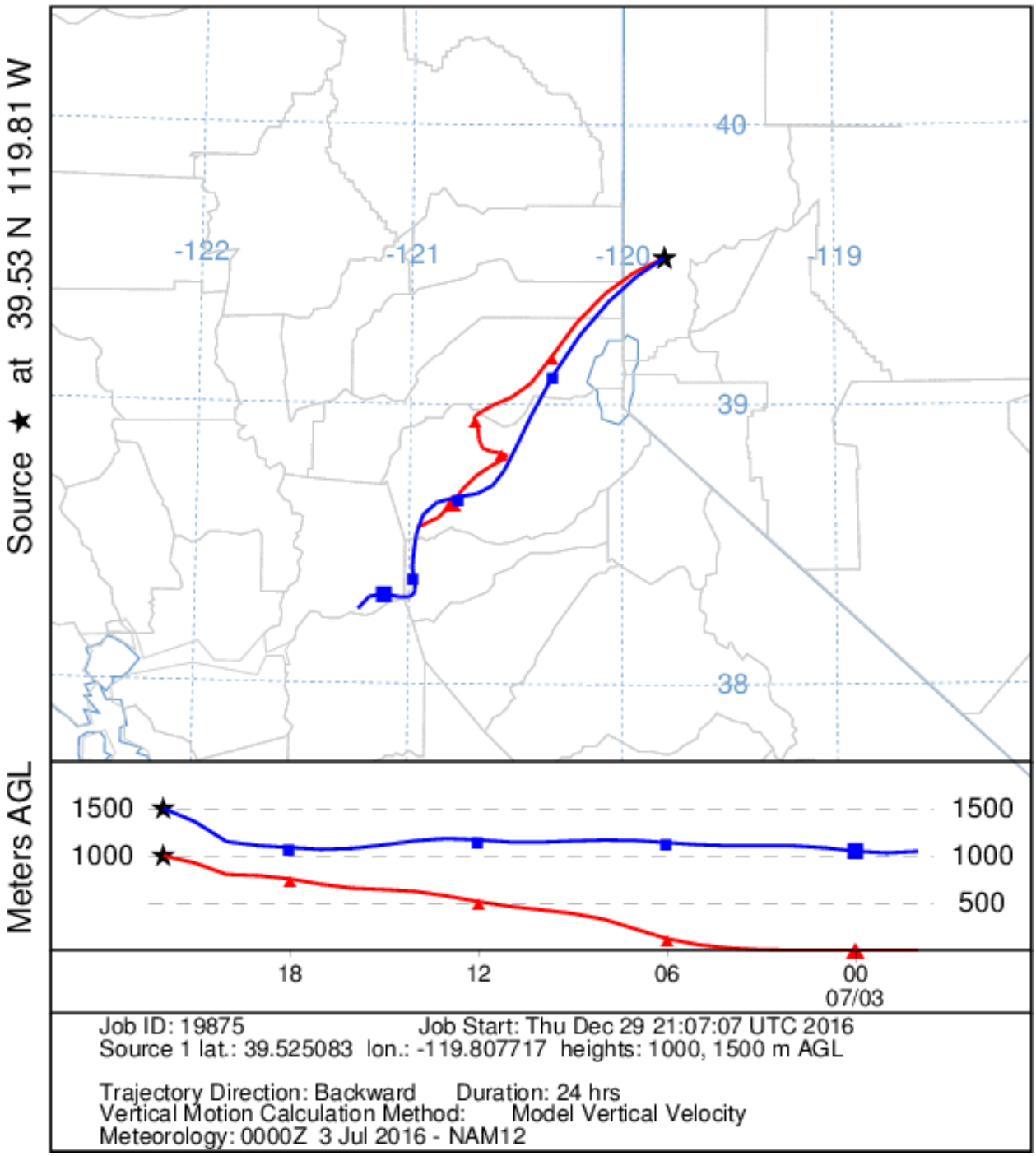
NOAA HYSPLIT MODEL
Backward trajectories ending at 1700 UTC 03 Jul 16
NAM Meteorological Data



Job ID: 19712 Job Start: Thu Dec 29 20:57:45 UTC 2016
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 3 Jul 2016 - NAM12

NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 03 Jul 16
NAM Meteorological Data



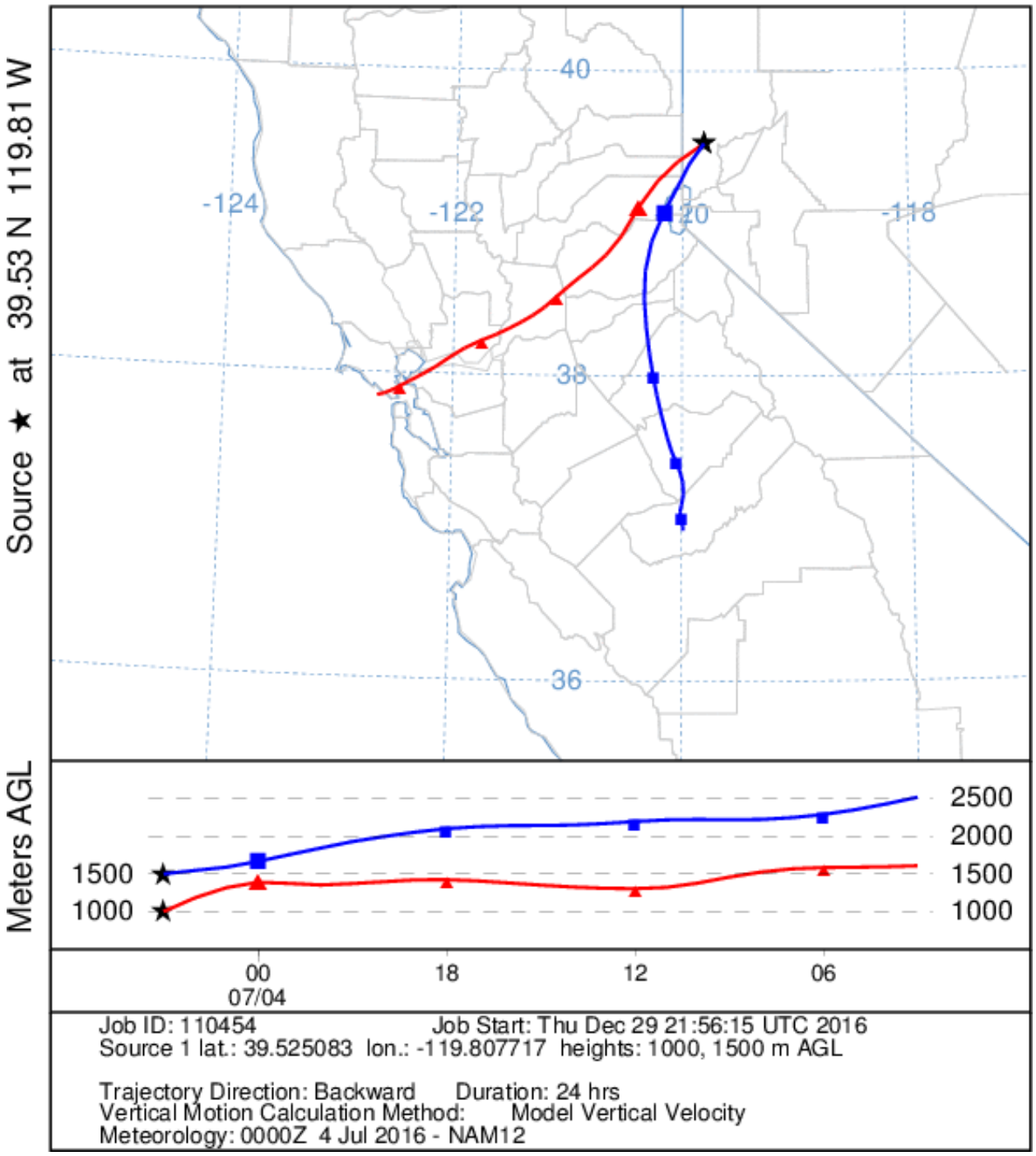
Job ID: 19875 Job Start: Thu Dec 29 21:07:07 UTC 2016
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 3 Jul 2016 - NAM12

NOAA HYSPLIT MODEL

Backward trajectories ending at 0300 UTC 04 Jul 16

NAM Meteorological Data



Job ID: 110454 Job Start: Thu Dec 29 21:56:15 UTC 2016

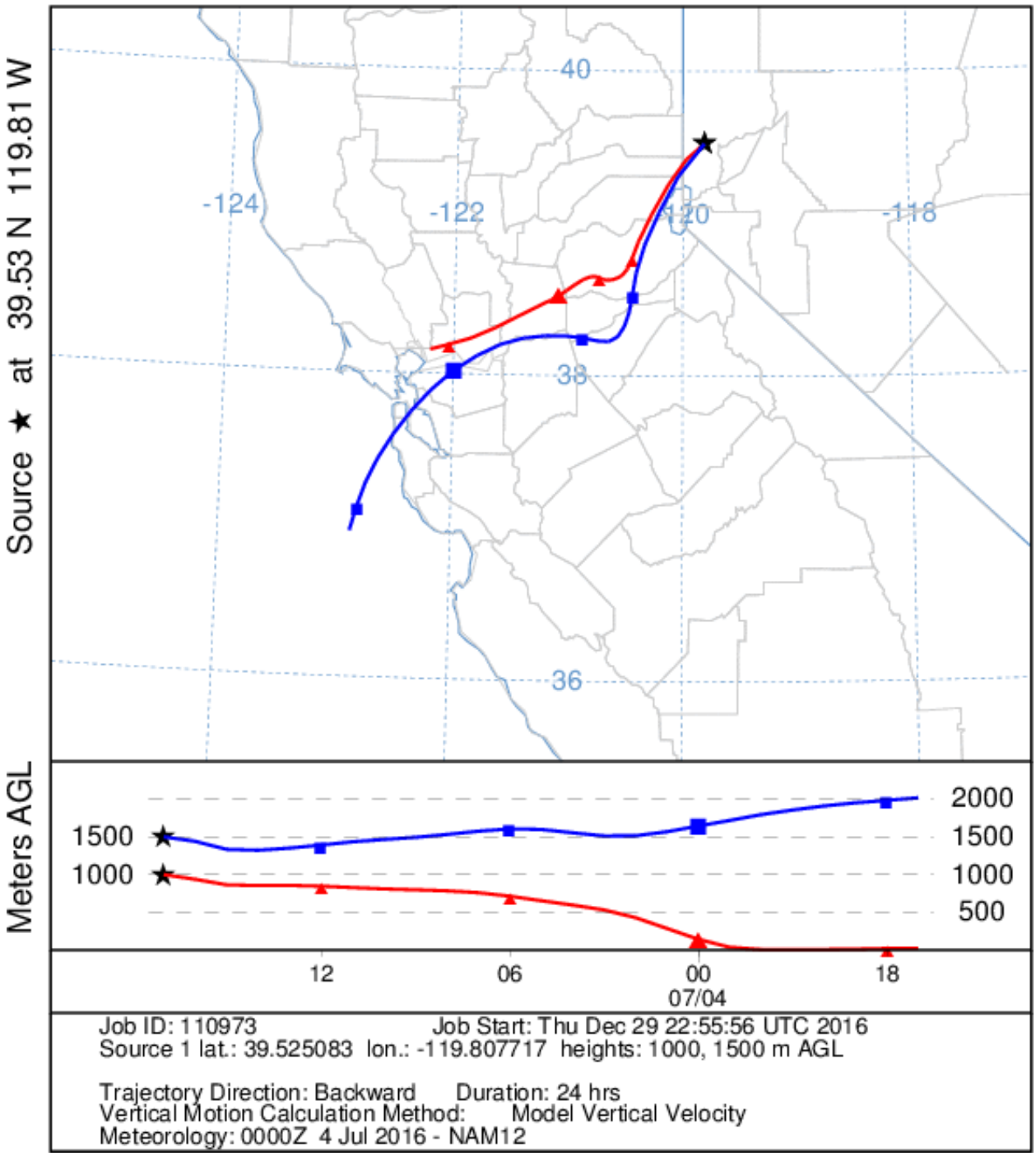
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs

Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 4 Jul 2016 - NAM12

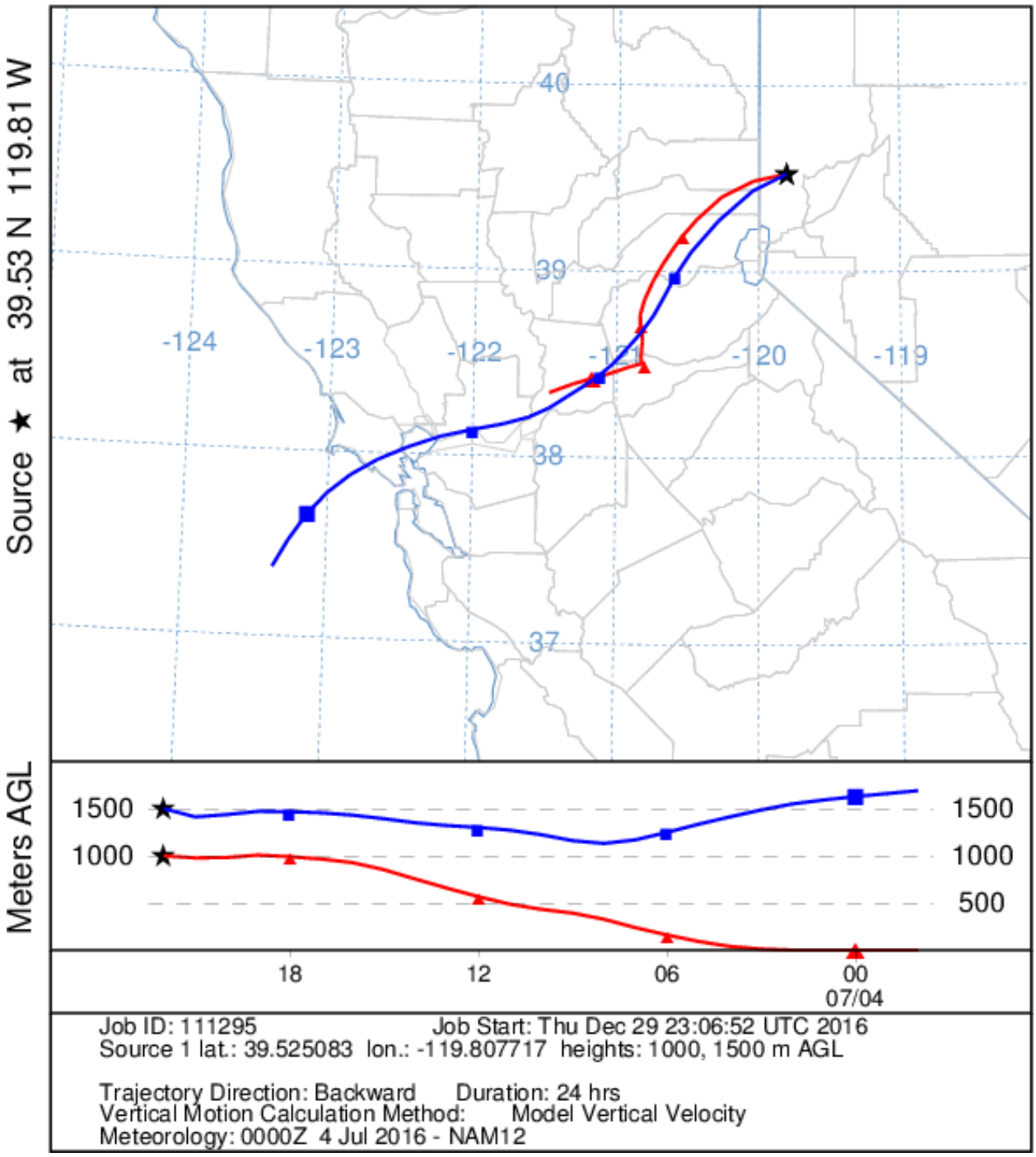
NOAA HYSPLIT MODEL
Backward trajectories ending at 1700 UTC 04 Jul 16
NAM Meteorological Data



Job ID: 110973 Job Start: Thu Dec 29 22:55:56 UTC 2016
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Jul 2016 - NAM12

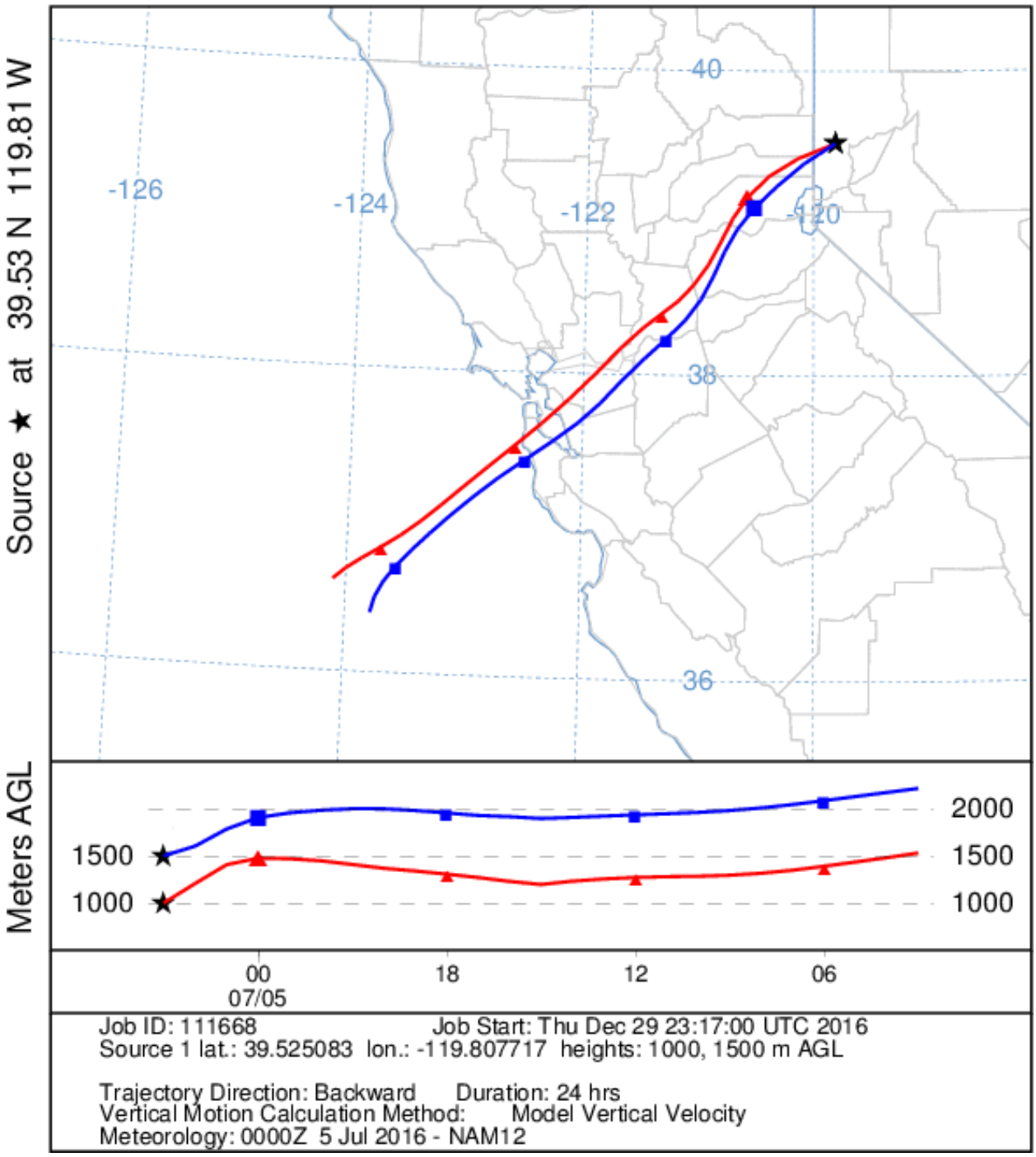
NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 04 Jul 16
NAM Meteorological Data



Job ID: 111295 Job Start: Thu Dec 29 23:06:52 UTC 2016
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Jul 2016 - NAM12

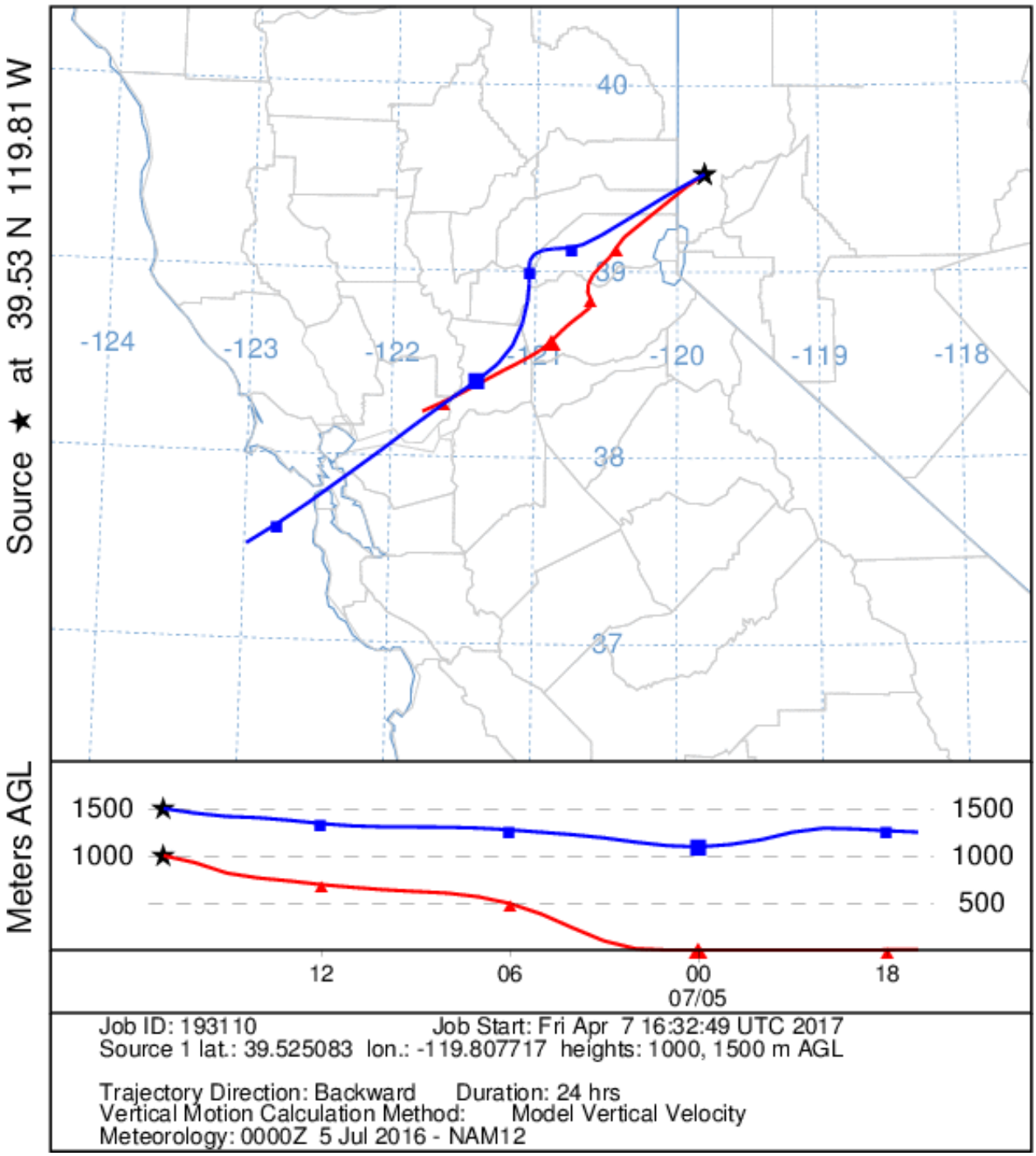
NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 05 Jul 16
NAM Meteorological Data



Job ID: 111668 Job Start: Thu Dec 29 23:17:00 UTC 2016
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 5 Jul 2016 - NAM12

NOAA HYSPLIT MODEL
Backward trajectories ending at 1700 UTC 05 Jul 16
NAM Meteorological Data



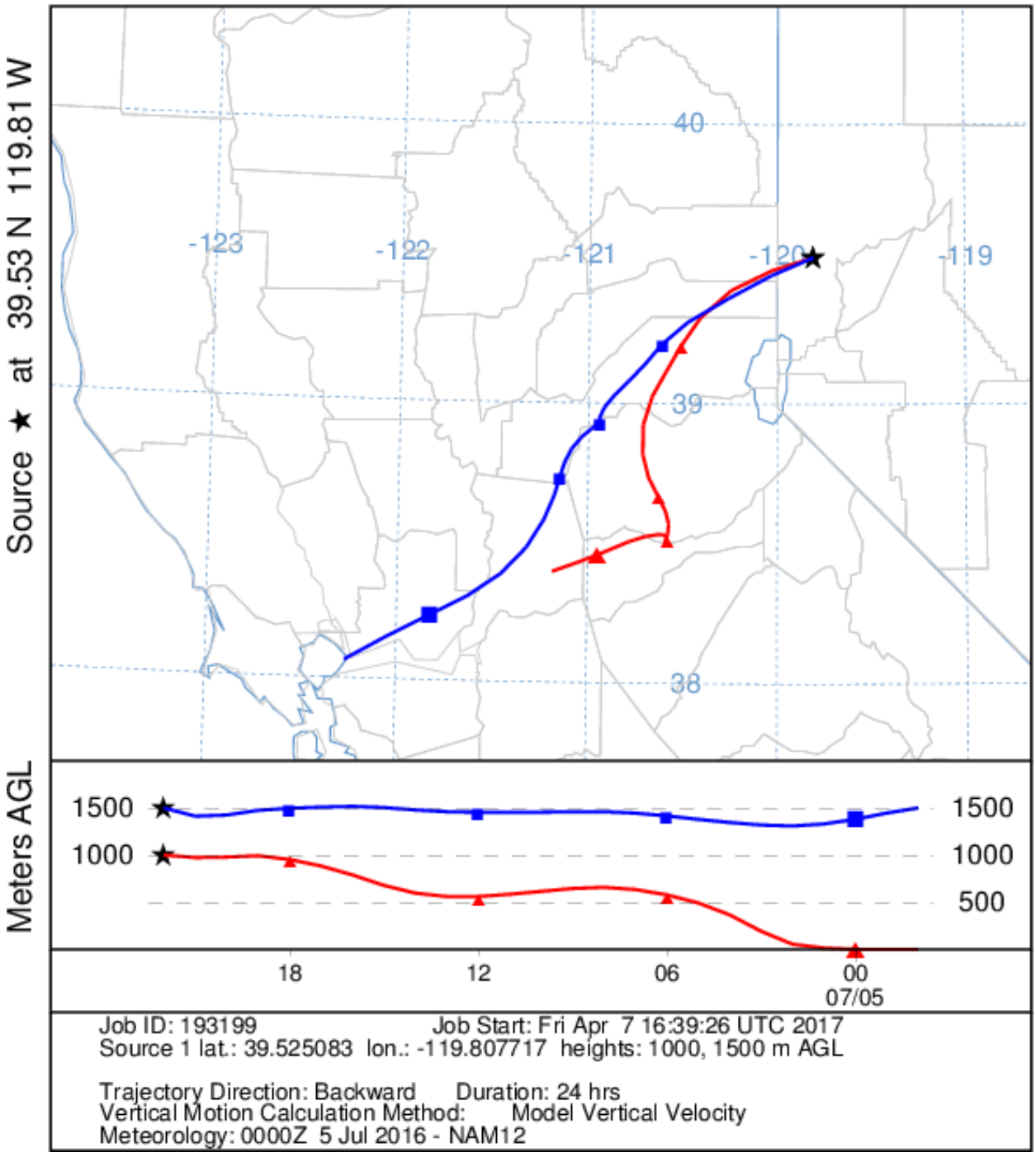
Job ID: 193110 Job Start: Fri Apr 7 16:32:49 UTC 2017
Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 5 Jul 2016 - NAM12

NOAA HYSPLIT MODEL

Backward trajectories ending at 2200 UTC 05 Jul 16

NAM Meteorological Data



Job ID: 193199 Job Start: Fri Apr 7 16:39:26 UTC 2017

Source 1 lat.: 39.525083 lon.: -119.807717 heights: 1000, 1500 m AGL

Trajectory Direction: Backward Duration: 24 hrs

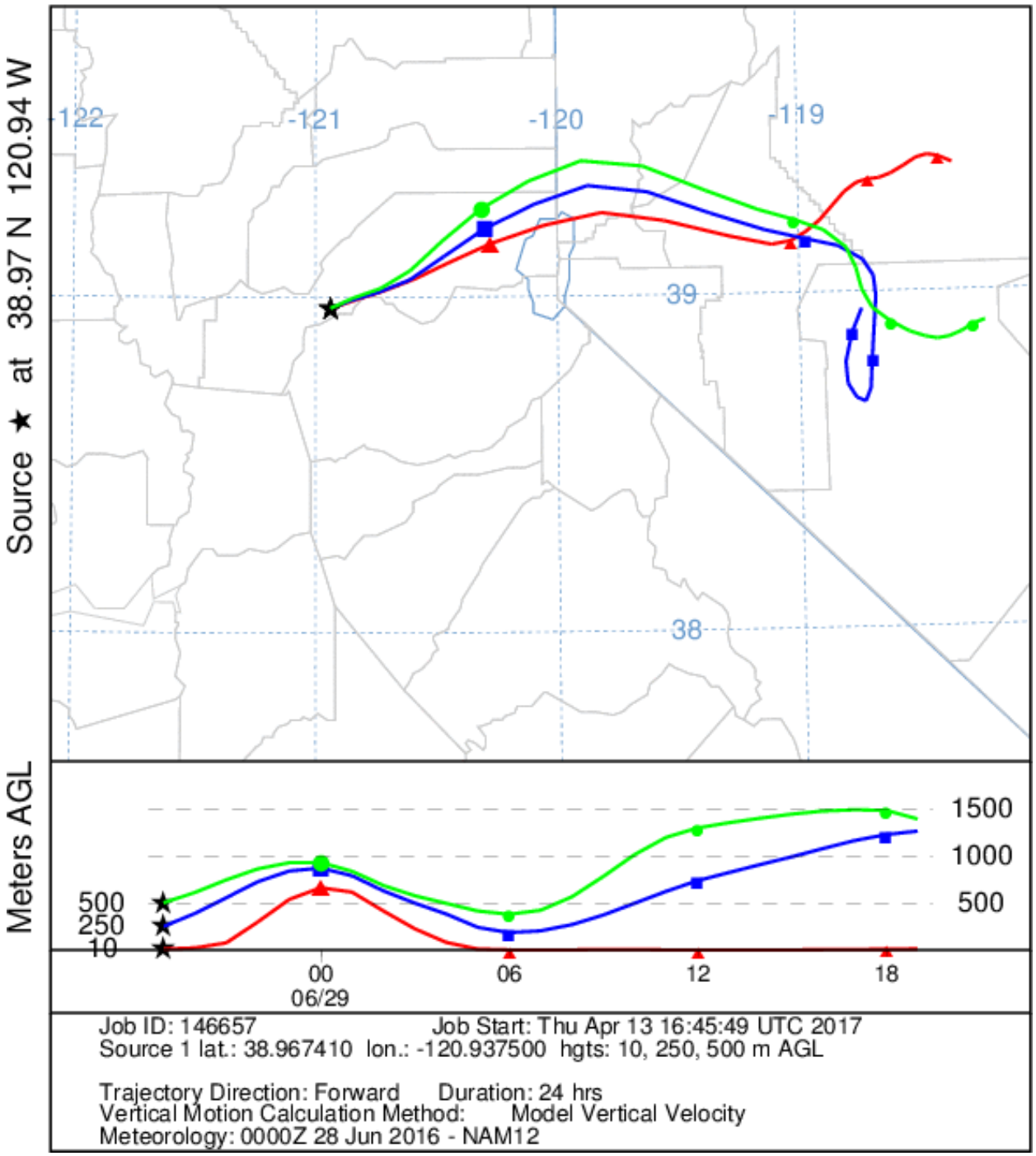
Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 5 Jul 2016 - NAM12

NOAA HYSPLIT MODEL

Forward trajectories starting at 1900 UTC 28 Jun 16

NAM Meteorological Data



Job ID: 146657 Job Start: Thu Apr 13 16:45:49 UTC 2017

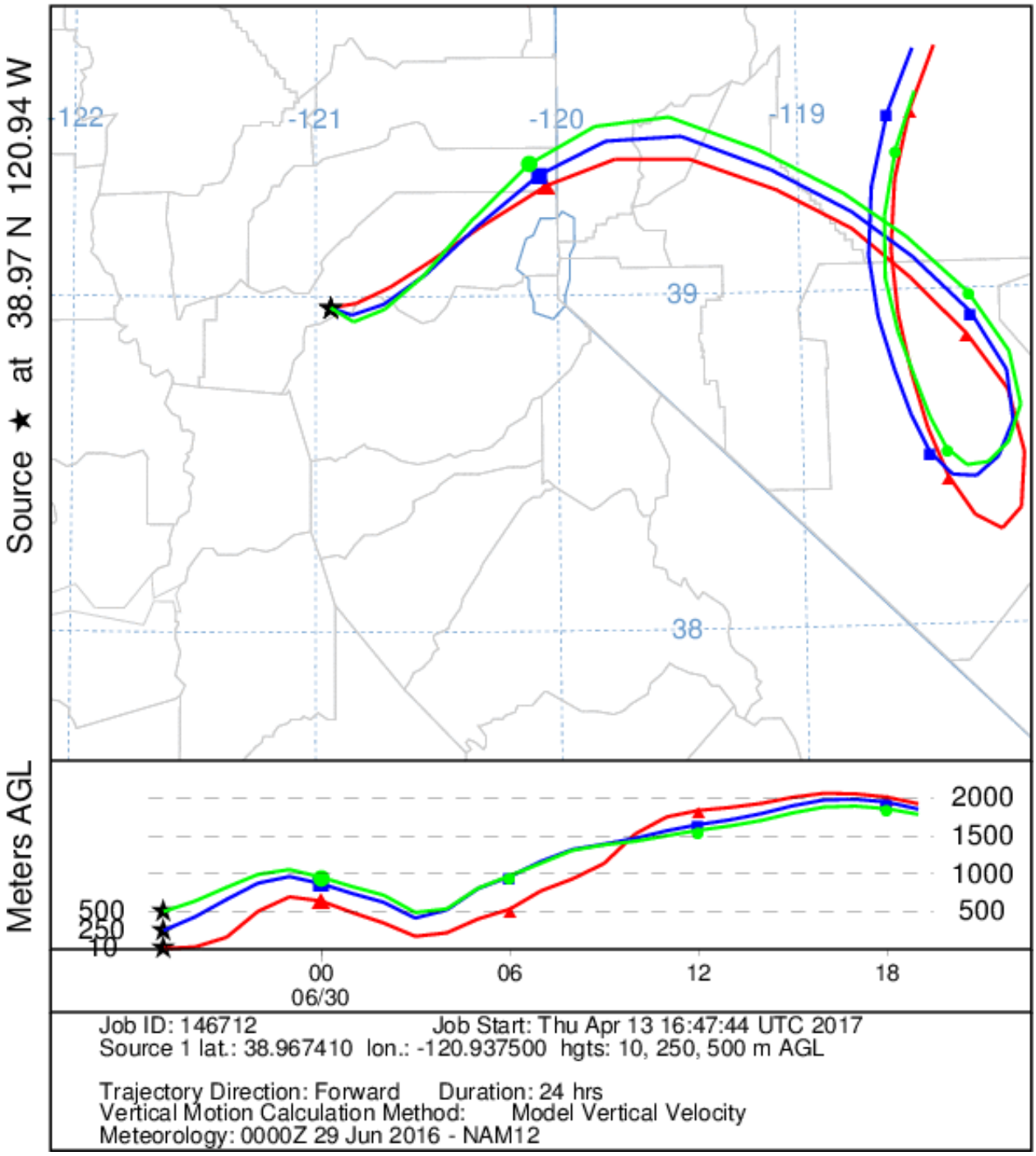
Source 1 lat.: 38.967410 lon.: -120.937500 hgts: 10, 250, 500 m AGL

Trajectory Direction: Forward Duration: 24 hrs

Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 28 Jun 2016 - NAM12

NOAA HYSPLIT MODEL
Forward trajectories starting at 1900 UTC 29 Jun 16
NAM Meteorological Data



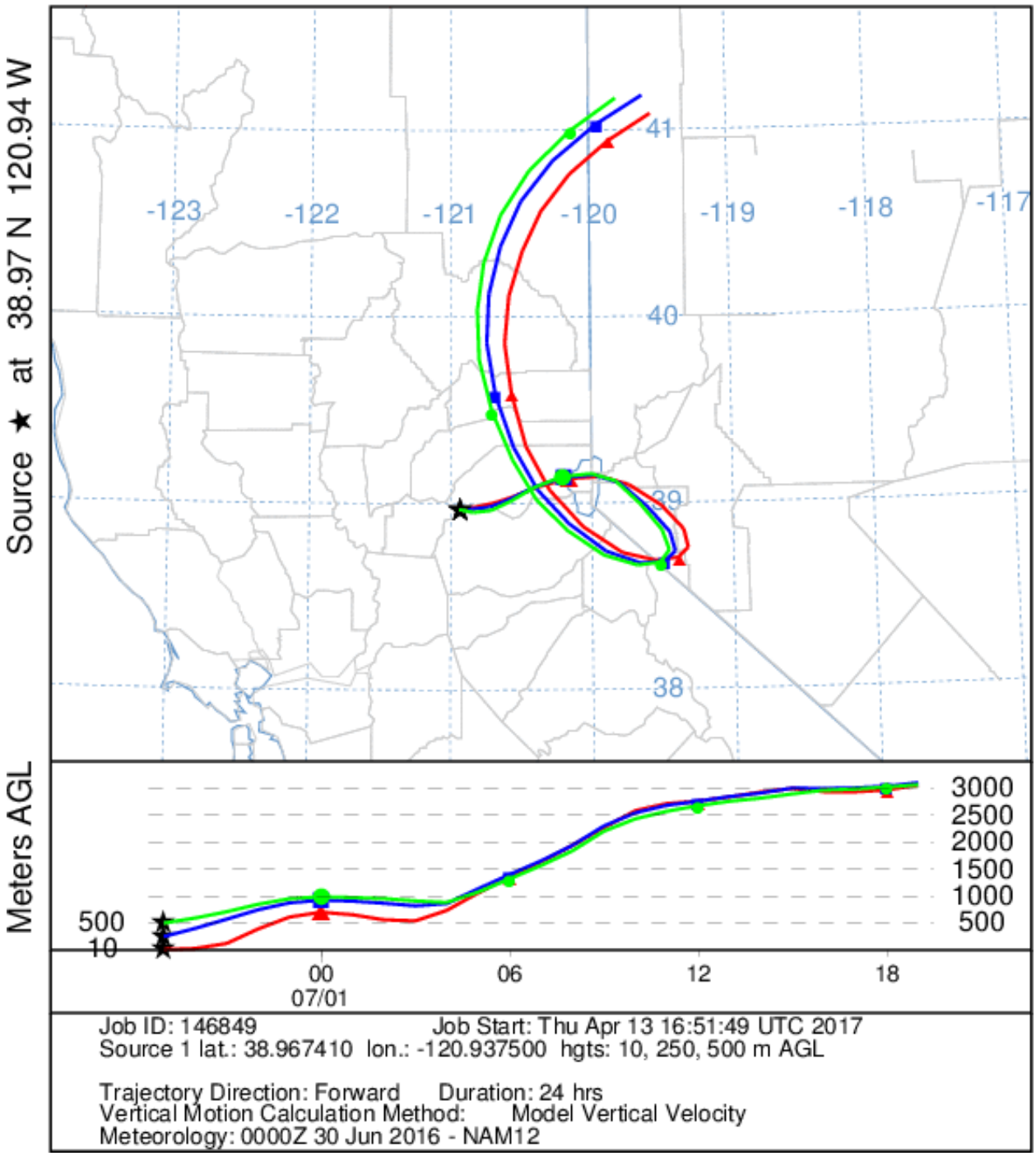
Job ID: 146712 Job Start: Thu Apr 13 16:47:44 UTC 2017
Source 1 lat.: 38.967410 lon.: -120.937500 hgts: 10, 250, 500 m AGL

Trajectory Direction: Forward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 29 Jun 2016 - NAM12

NOAA HYSPLIT MODEL

Forward trajectories starting at 1900 UTC 30 Jun 16

NAM Meteorological Data



Job ID: 146849 Job Start: Thu Apr 13 16:51:49 UTC 2017

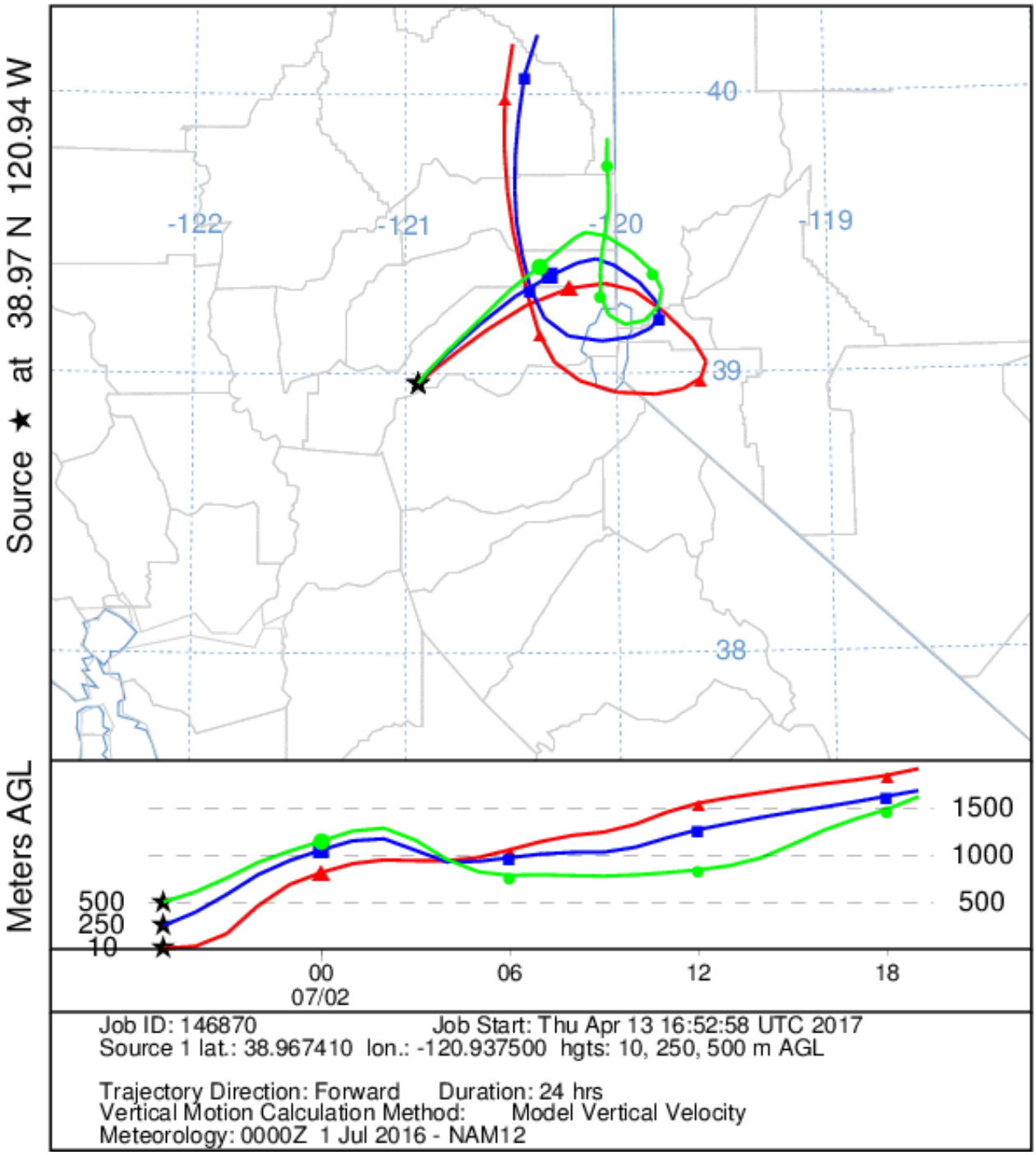
Source 1 lat.: 38.967410 lon.: -120.937500 hgts: 10, 250, 500 m AGL

Trajectory Direction: Forward Duration: 24 hrs

Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 30 Jun 2016 - NAM12

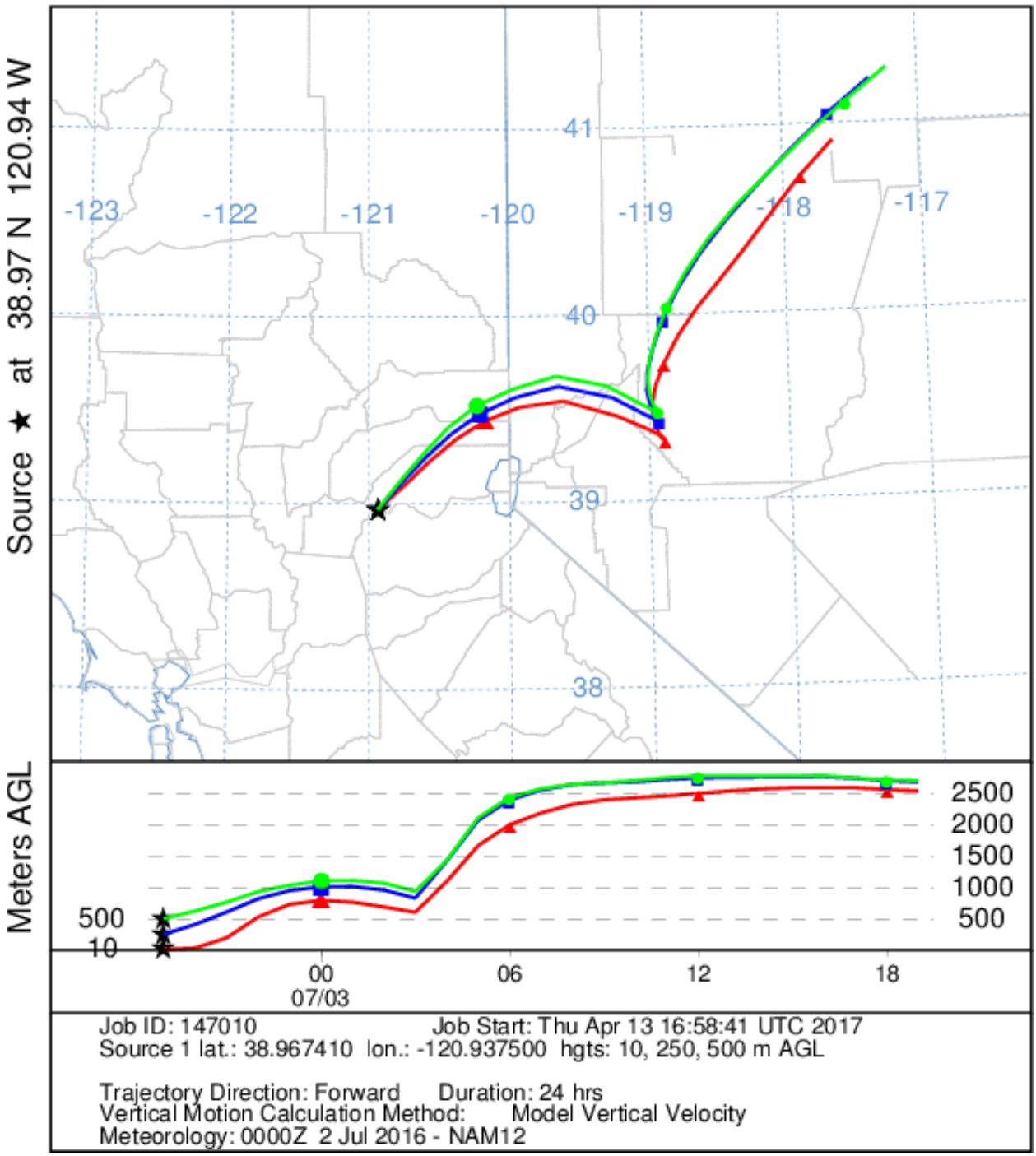
NOAA HYSPLIT MODEL
Forward trajectories starting at 1900 UTC 01 Jul 16
NAM Meteorological Data



Job ID: 146870 Job Start: Thu Apr 13 16:52:58 UTC 2017
Source 1 lat.: 38.967410 lon.: -120.937500 hgts: 10, 250, 500 m AGL

Trajectory Direction: Forward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Jul 2016 - NAM12

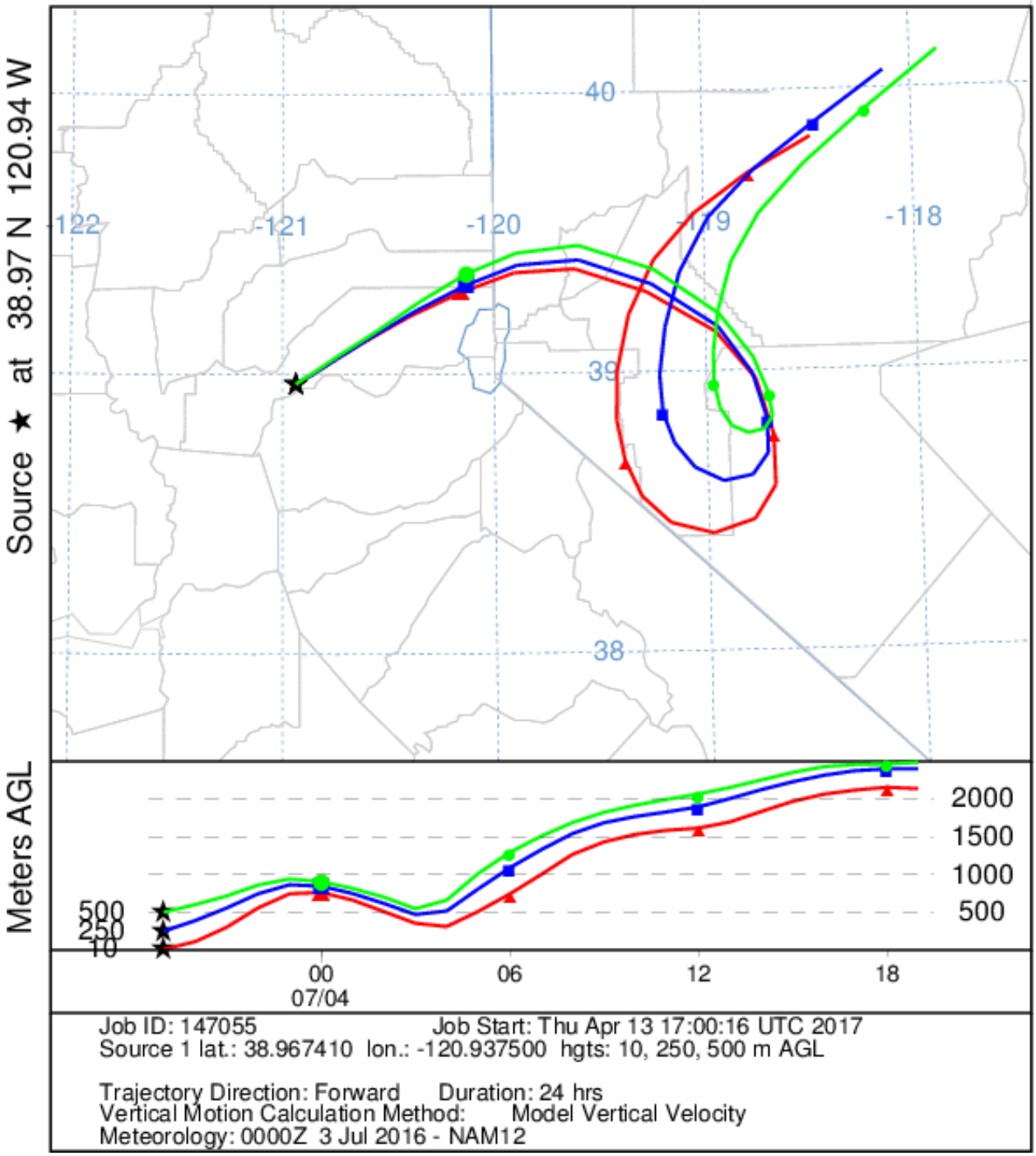
NOAA HYSPLIT MODEL
Forward trajectories starting at 1900 UTC 02 Jul 16
NAM Meteorological Data



Job ID: 147010 Job Start: Thu Apr 13 16:58:41 UTC 2017
Source 1 lat.: 38.967410 lon.: -120.937500 hgts: 10, 250, 500 m AGL

Trajectory Direction: Forward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 2 Jul 2016 - NAM12

NOAA HYSPLIT MODEL
Forward trajectories starting at 1900 UTC 03 Jul 16
NAM Meteorological Data



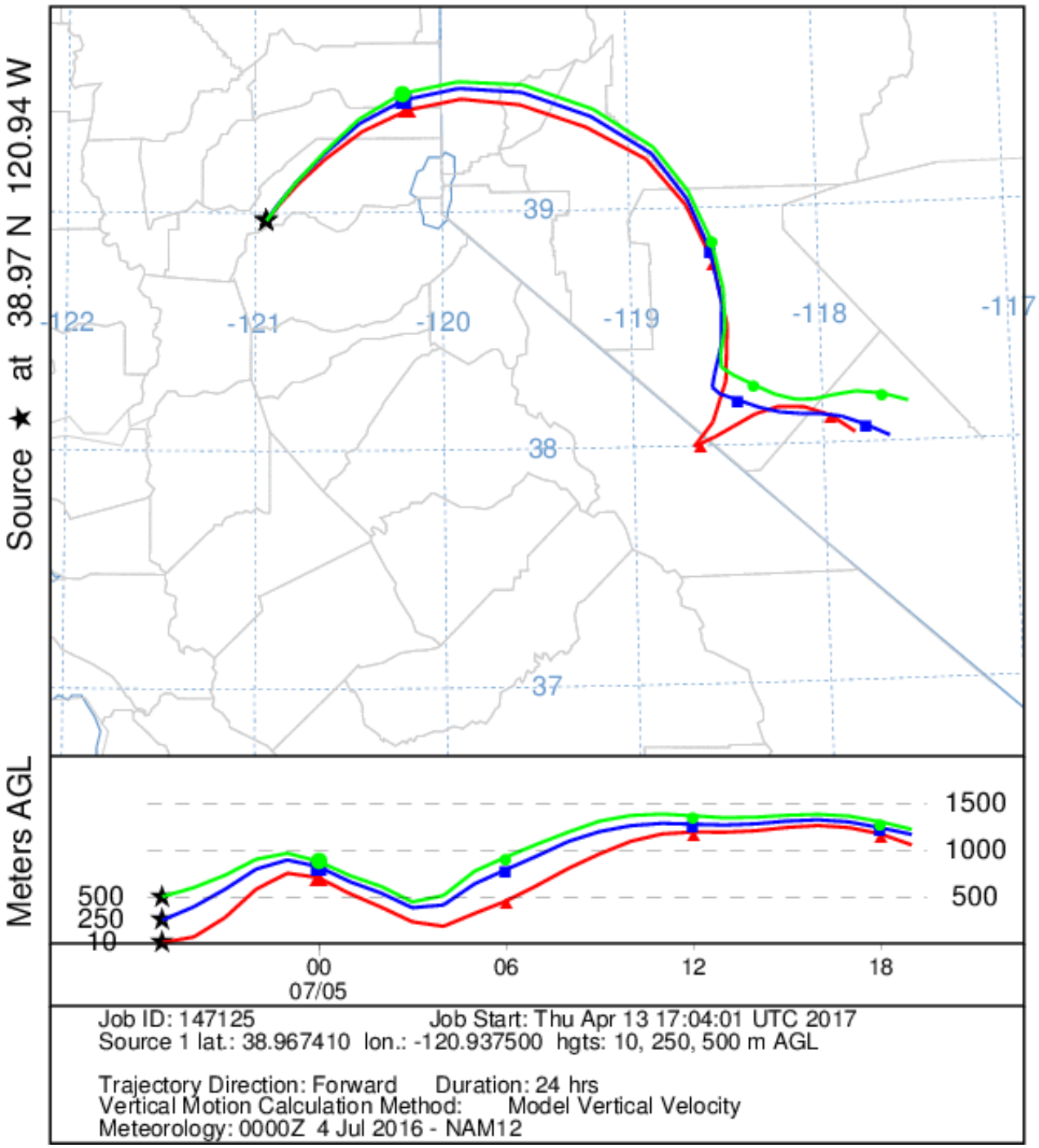
Job ID: 147055 Job Start: Thu Apr 13 17:00:16 UTC 2017
Source 1 lat.: 38.967410 lon.: -120.937500 hgts: 10, 250, 500 m AGL

Trajectory Direction: Forward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 3 Jul 2016 - NAM12

NOAA HYSPLIT MODEL

Forward trajectories starting at 1900 UTC 04 Jul 16

NAM Meteorological Data



Job ID: 147125 Job Start: Thu Apr 13 17:04:01 UTC 2017

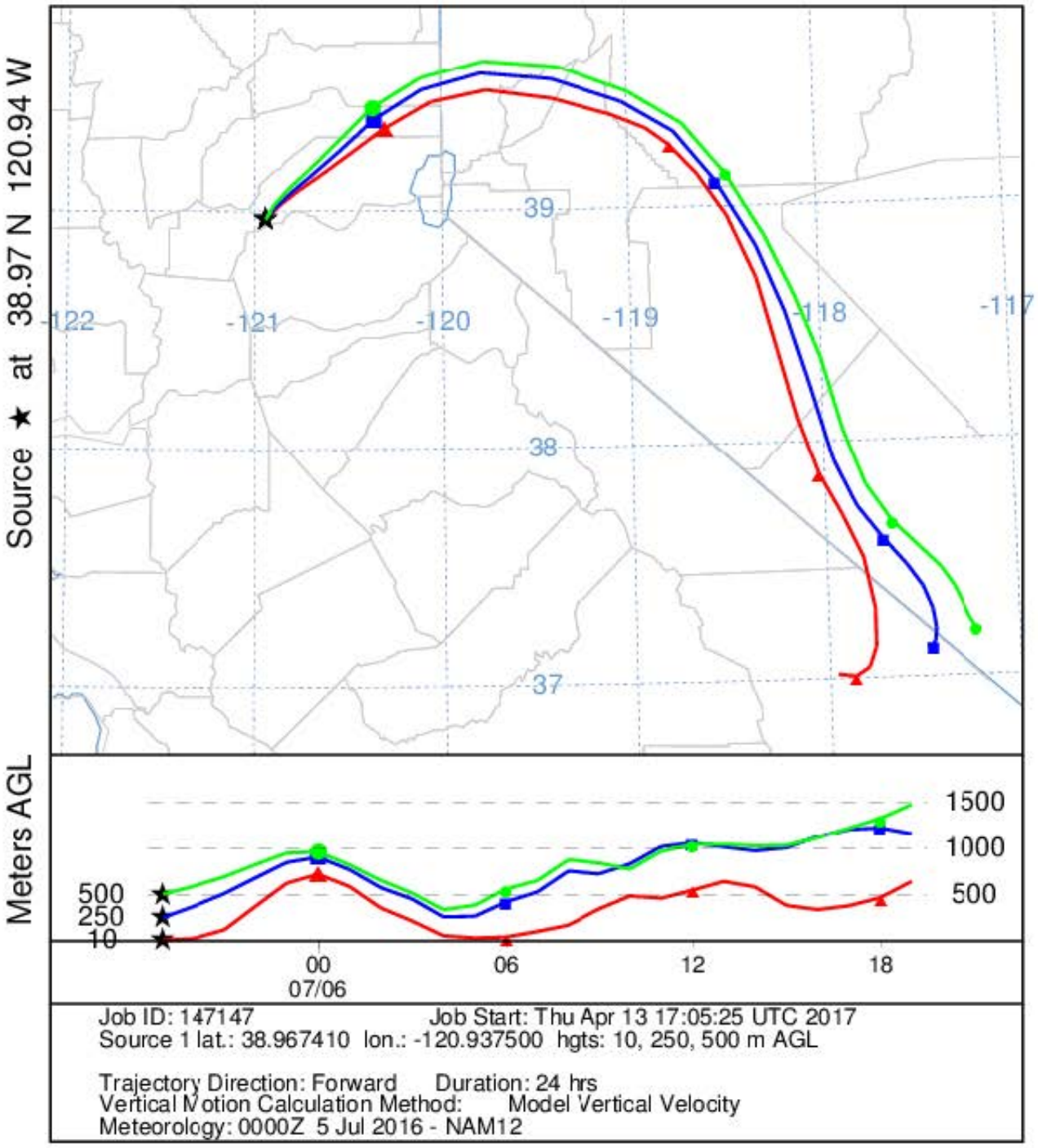
Source 1 lat.: 38.967410 lon.: -120.937500 hgts: 10, 250, 500 m AGL

Trajectory Direction: Forward Duration: 24 hrs

Vertical Motion Calculation Method: Model Vertical Velocity

Meteorology: 0000Z 4 Jul 2016 - NAM12

NOAA HYSPLIT MODEL
Forward trajectories starting at 1900 UTC 05 Jul 16
NAM Meteorological Data



Job ID: 147147 Job Start: Thu Apr 13 17:05:25 UTC 2017
Source 1 lat.: 38.967410 lon.: -120.937500 hgts: 10, 250, 500 m AGL

Trajectory Direction: Forward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 5 Jul 2016 - NAM12

APPENDIX G

NWS AREA FORECAST DISCUSSIONS

993
FXUS65 KREV 280930
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
230 AM PDT TUE JUN 28 2016

.SYNOPSIS...

Highs around 100 degrees are expected for lower elevations of western Nevada through Friday as high pressure remains over the Great Basin. A few thunderstorms are possible south of Highway 50 each afternoon through Friday. For the holiday weekend, dry conditions are expected with temperatures remaining above average.

&&

.SHORT TERM...

Few changes are expected in the overall weather pattern through Thursday, as high pressure persists over the Four Corners region. Daytime temperatures will remain about 10 degrees above average, yielding highs near or above 100 degrees for most lower valleys in western NV each day. Highs at Reno may come within a degree or two of record values for the final three days of June (all of which were set three years ago). Typical late afternoon-evening zephyr-type breezes with gusts around 25 mph are expected for the next three days.

Isolated convection is possible each afternoon and evening mainly south of US-50, as increased mid level moisture and instability reach these areas. No significant forcing mechanism is evident and instability is not very impressive, so most thunderstorms that develop will be pulse type with slow movement. Brief heavy rainfall and gusty outflow winds will be the primary threats, along with lightning strikes which could produce new fire starts. MJD

.Long Term (Friday Onward)...

Predictability for the upcoming holiday weekend is perhaps a little less than normal with meaningful differences in the ECMWF vs GFS. Therefore messaging will focus around potential for continued heat (GFS) or potential for breezier conditions, critical fire weather to develop (ECMWF).

For the Friday-Saturday period guidance is reasonably consistent showing weak upper trough over N Cal but still above normal heights over the region. Flow is somewhat dry with most of the monsoon moisture well east of the region, so only isolated storms possible in the favored convergence zones such as Mono-Mineral and Lassen. Temperatures likely to remain hot with highs near 95-100 in Western NV valleys.

Sunday-Tuesday is where we see simulations diverge, with ECMWF developing a pronounced trough signal over much of the west while GFS redevelops ridging over the Great Basin. I have no real data to suggest favoring one over the other, especially considering that yesterday the models were each showing the opposite outcome. The GEFS 5-day means for next week are leaning toward more of a trough situation but still above normal heights and temperatures. Anyways, I won't make radical changes to this forecast period but we'll continue to highlight potentials for either continued heat for 4th of July or perhaps breezy and slightly cooler conditions with critical fire weather. -Chris

&&

.Aviation...

Generally VFR flight conditions through Wednesday with typical late afternoon and evening westerly zephyr breezes. Winds will be of weak-moderate magnitude with gusts on the order of 20-25 kts at RNO, CXP, MMH.

Main weather for pilots to be aware of is development of isolated high-based thunderstorms over the central and southern Sierra this afternoon and again Wednesday. We had a few cells develop over the

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White Mtns Monday afternoon as initial surge of moisture aloft
worked into the region. Latest high resolution simulations show
storms developing after 20z today on the high terrain around MMH,
BIH with strong/erratic outflow winds, lightning, and MVFR showers.
Coverage about 20-30%. There's a small but non-zero risk a couple
storms could develop farther north perhaps near Bridgeport and
Minden after 23z along the zephyr convergence zone. Most cells
should be on the wane after 02z this evening.

More of the same for Wednesday but probably greater coverage and
farther north along the Pine Nut mountains. -Chris

.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
&&

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For more information from the National Weather Service visit...
http://weather.gov/reno
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741
FXUS65 KREV 281604
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
904 AM PDT TUE JUN 28 2016

.UPDATE...

Latest NAM, HRRR and GFS all support convection a bit farther north today than we have forecast...so we will update to bring isolated convection into parts of Mineral and southern Lyon counties late this afternoon. Will also introduce isolated convection into far southeast Douglas County in the Pine Nut Mountains by the early evening hours. Forecast soundings in Mono County still show fairly slow storm motions and pwats approaching 0.65 inches. So...even with a dry sub-cloud layer any stronger storms could produce enough moderate rain to cause debris flows on the Marina Fire burn scar. This will be the case through the rest of the week. 20

&&

.PREVIOUS DISCUSSION... /Issued 230 AM PDT TUE JUN 28 2016/

SYNOPSIS...

Highs around 100 degrees are expected for lower elevations of western Nevada through Friday as high pressure remains over the Great Basin. A few thunderstorms are possible south of Highway 50 each afternoon through Friday. For the holiday weekend, dry conditions are expected with temperatures remaining above average.

SHORT TERM...

Few changes are expected in the overall weather pattern through Thursday, as high pressure persists over the Four Corners region. Daytime temperatures will remain about 10 degrees above average, yielding highs near or above 100 degrees for most lower valleys in western NV each day. Highs at Reno may come within a degree or two of record values for the final three days of June (all of which were set three years ago). Typical late afternoon-evening zephyr-type breezes with gusts around 25 mph are expected for the next three days.

Isolated convection is possible each afternoon and evening mainly south of US-50, as increased mid level moisture and instability reach these areas. No significant forcing mechanism is evident and instability is not very impressive, so most thunderstorms that develop will be pulse type with slow movement. Brief heavy rainfall and gusty outflow winds will be the primary threats, along with lightning strikes which could produce new fire starts. MJD

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Predictability for the upcoming holiday weekend is perhaps a little less than normal with meaningful differences in the ECMWF vs GFS. Therefore messaging will focus around potential for continued heat (GFS) or potential for breezier conditions, critical fire weather to develop (ECMWF).

For the Friday-Saturday period guidance is reasonably consistent showing weak upper trough over N Cal but still above normal heights over the region. Flow is somewhat dry with most of the monsoon moisture well east of the region, so only isolated storms possible in the favored convergence zones such as Mono-Mineral and Lassen. Temperatures likely to remain hot with highs near 95-100 in Western NV valleys.

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```
continue to highlight potentials for either continued heat for 4th
of July or perhaps breezy and slightly cooler conditions with
critical fire weather. -Chris

Aviation...

Generally VFR flight conditions through Wednesday with typical late
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moderate magnitude with gusts on the order of 20-25 kts at RNO,
CXP, MMH.

Main weather for pilots to be aware of is development of isolated
high-based thunderstorms over the central and southern Sierra this
afternoon and again Wednesday. We had a few cells develop over the
White Mtns Monday afternoon as initial surge of moisture aloft
worked into the region. Latest high resolution simulations show
storms developing after 20z today on the high terrain around MMH,
BIH with strong/erratic outflow winds, lightning, and MVFR showers.
Coverage about 20-30%. There's a small but non-zero risk a couple
storms could develop farther north perhaps near Bridgeport and
Minden after 23z along the zephyr convergence zone. Most cells
should be on the wane after 02z this evening.

More of the same for Wednesday but probably greater coverage and
farther north along the Pine Nut mountains. -Chris

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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For more information from the National Weather Service visit...
http://weather.gov/reno
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232
FXUS65 KREV 282113
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
213 PM PDT TUE JUN 28 2016

.SYNOPSIS...

Highs around 100 degrees are expected for lower elevations of western Nevada through Friday as high pressure remains over the Great Basin. A few thunderstorms are possible south of Highway 50 each afternoon through Friday. There could be a few thunderstorms just north of Highway 50 along the eastern Sierra Friday afternoon, but this is highly uncertain for now. For the holiday weekend, dry conditions are expected with temperatures remaining above average.

&&

.SHORT TERM...

The primary changes to the forecast today involve trying to better refine the areas where convection may develop through Thursday.

The GFS...NAM and HRRR all have development starting closer to the Sierra crest in Mono County this afternoon...then move this development farther north and east into southern Lyon and Mineral counties by this evening. There is a bit less movement to the east for Wednesday afternoon and evening but we also see stronger late afternoon and early evening westerly flow that would aid in developing convection north along the Pine Nut Mountains and possibly as far north as the southern Virginia Range.

Overall...the instability is not overwhelming either day...but the very hot temperatures and a weak short wave in the mid levels is providing just enough lift to aid the development of storms. Dry sub-cloud layers today should begin to moisten just a bit by Wednesday. Dry storms today should give way to hybrid storms by Wednesday and slow storm motions will also help produce some brief moderate to heavy downpours in the strongest storms. Gusty outflow winds of up to 50 mph along with dry lightning strikes outside of the rain cores are also possible.

Storms redevelop Thursday...but this development could be just a bit farther east initially. Slow storm motions should again help produce rain in the strongest storms...even with dry air near the surface. By Friday the model guidance begins to diverge as the GFS is a bit more progressive with southwest flow aloft shearing most of the moisture to the east while the NAM is digging a trough toward California that is producing backing flow in the mid levels. That allows more moisture to be drawn north and initiates convection along the Sierra and into northeast California. While the ECMWF has a little development in far northern California it mostly supports the GFS. So for now we will leave the higher pops out of the forecast for Friday.

Well above normal high temperatures continue into Friday with a few records possible Wednesday and Thursday. Highs reach the 98-103 range in the lower valleys with upper 80s to lower 90s in the Sierra valleys.

.LONG TERM...Saturday through Tuesday...

Only minimal changes were made to the extended forecast. The GFS is still trying to maintain or rebuild the ridge through Tuesday while the latest ECMWF shows more of an elongated trough along the CA coast. The ECMWF would provide slightly cooler temperatures but the chance for stronger winds. The GFS solution supports higher temperatures and the possibility of weak convection in the favored convergence zones...especially Mono County...each day.

The GEFS ensemble members show a variety of solutions with no operational model favored over any other. Thus...we will maintain a dry forecast with slightly above average temperatures through the extended period. Bear in mind this forecast remains highly uncertain and confidence is moderate at best that the current

forecast will play out as stated.

&&

.AVIATION...

Thunderstorms are possible each afternoon and evening south of
Highway 50 from near the Sierra crest east to about Highway 95
through Friday. There is an outside chance storms could develop
farther north along the eastern side of the Sierra late Friday
afternoon...but there is great uncertainty in this solution for
now.

Typical zephyr winds are likely each day through Friday with gusts
in the 20-25 knot range immediately east of the Sierra. Lighter
gusts are expected east of Highway 95 except in the vicinity of
thunderstorms. VFR conditions are also likely each day through
Friday except in the vicinity of thunderstorms. XX

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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For more information from the National Weather Service visit...
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767
FXUS65 KREV 291023
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
323 AM PDT WED JUN 29 2016

.SYNOPSIS...

Highs around 100 degrees are expected for lower elevations of western Nevada through Friday as high pressure remains over the Great Basin. A few thunderstorms are possible today and Thursday mainly south of Highway 50, with the threat of isolated storms expanding farther north on Friday. For the holiday weekend, dry conditions are expected with temperatures remaining above average.

&&

.SHORT TERM...

The most notable change to the current forecast was expanding the slight chance of thunder on Friday afternoon-evening to include more of eastern CA-western NV.

Otherwise, the majority of the ongoing forecast remains intact. For today, thunderstorm chances will again be highest for Mono County, with more isolated coverage northward into portions of western NV from the Pine Nut mountains eastward across Mineral and Lyon Counties. Fewer cells are expected Thursday as the ridge retreats southward into the Desert Southwest region, which will weaken the moisture feed for the Sierra and western NV south of US-50.

For Friday, short range guidance is in better agreement with placing a weak upper low/trough over central CA, which would spread better instability and increased mid-upper level moisture farther north across eastern CA-western NV. Although there are still uncertainties with the location of the low, the general idea favors eastern CA-far northwest NV for initial isolated thunderstorm development in the afternoon, then spreading east across much of western NV by early evening. We are not expecting a widespread convective event with significant impacts, although slow cell movement may produce localized heavy rainfall which could lead to possible flooding or debris flows in recent burn scars, especially in steeper terrain.

Daytime temperatures will continue to run about 10 degrees above average through Friday. Highs will remain near or above 100 degrees for most lower elevations, with mid to upper 80s for the Sierra valleys.

One other item of note is the possibility of smoke and haze from the Trailhead wildfire spreading across eastern CA-far western NV later today. For now, we will just mention some haze in eastern CA north of I-80 and south of Susanville, and far western NV just north of Reno. For more details, see the Aviation segment below. MJD

.Long Term (Saturday Onward)...

Messaging focus will be on continued warm temperatures and drier flow for the holiday weekend into early next week. Pretty typical stuff for the beginning of July. No big changes made to the forecast.

Simulations have come into somewhat better agreement showing a weak upper trough along the west coast persisting into the middle of next week with a dry southwest flow aloft over the region. As a result thunderstorm chances are minimal, except perhaps some isolated cells in favored convergence zones. Predictability of these are too low this far out to include in the forecast. Temperatures will be slightly cooler compared to this week, but not by much with 500 mb heights remaining near to above normal.

Weak-moderate daily winds are expected through the period. One thing to watch is both GFS, ECMWF bring a more potent trough through the Pac NW next Tuesday-Wednesday which would increase the winds around our region, perhaps into critical fire weather levels. GEFS precipitable water plumes show the area drying out quite a bit too

so some poor humidity levels are possible with the winds. -Chris

&&

.Aviation...

Generally VFR with typical weak-moderate late afternoon westerly winds through Friday. However as moisture aloft has increased we do expect isolated-scattered thunderstorms to develop each afternoon, early evening. These storms will produce MVFR ceilings and visibility, lightning, strong outflow winds, and possible blowing dust. Areas south of Highway 50 have the best chances of seeing impacts from thunderstorms.

For today, based on the latest NCAR convective resolving ensemble, we'll likely see storms initiate near MMH as early as 19-20z, with development further east and north, perhaps extending up along the Pine Nuts east of MEV, CXP by 22-00z. This simulation did quite well on thunderstorm coverage yesterday. I can't completely rule out cells near RNO but simulations keep activity over the Pine Nuts, Virginia Range well SE of the field. Note that our primary radar KRGX is out of service until likely early afternoon today.

Another item to mention is potential for smoke from the Trailhead wildfire east of Auburn to impact our region. If the fire continues to be active today, HYSPLIT simulations show light to moderate levels of smoke working into the Tahoe, Reno areas with the zephyr westerly wind, after 22z. While I won't put restrictions in the TAFs due to uncertainty, degraded flight visibility is possible between Reno and Sacramento over the Sierra with terrain obscuration. That is, again, assuming the fire remains active today. -Chris

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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678
FXUS65 KREV 291610 AAA
AFDREV

Area Forecast Discussion...UPDATED
National Weather Service Reno NV
910 AM PDT WED JUN 29 2016

.UPDATE...
A quick update to add thunderstorms to Eastern Churchill County this afternoon and evening. Given the trend of the past couple days of the convection being slightly further north than models have shown (except the NCAR high res ensemble), thought it would be prudent to add here. It will be right on the edge, but given the Horseshoe fire in that area any potential would be a concern to firefighters. The chance is only around 10%. Otherwise, no other changes planned or anticipated this morning. Wallmann

&&

.SYNOPSIS...
Highs around 100 degrees are expected for lower elevations of western Nevada through Friday as high pressure remains over the Great Basin. A few thunderstorms are possible today and Thursday mainly south of Highway 50, with the threat of isolated storms expanding farther north on Friday. For the holiday weekend, dry conditions are expected with temperatures remaining above average.

&&

.PREVIOUS DISCUSSION... /Issued 323 AM PDT WED JUN 29 2016/

SHORT TERM...

The most notable change to the current forecast was expanding the slight chance of thunder on Friday afternoon-evening to include more of eastern CA-western NV.

Otherwise, the majority of the ongoing forecast remains intact. For today, thunderstorm chances will again be highest for Mono County, with more isolated coverage northward into portions of western NV from the Pine Nut mountains eastward across Mineral and Lyon Counties. Fewer cells are expected Thursday as the ridge retreats southward into the Desert Southwest region, which will weaken the moisture feed for the Sierra and western NV south of US-50.

For Friday, short range guidance is in better agreement with placing a weak upper low/trough over central CA, which would spread better instability and increased mid-upper level moisture farther north across eastern CA-western NV. Although there are still uncertainties with the location of the low, the general idea favors eastern CA-far northwest NV for initial isolated thunderstorm development in the afternoon, then spreading east across much of western NV by early evening. We are not expecting a widespread convective event with significant impacts, although slow cell movement may produce localized heavy rainfall which could lead to possible flooding or debris flows in recent burn scars, especially in steeper terrain.

Daytime temperatures will continue to run about 10 degrees above average through Friday. Highs will remain near or above 100 degrees for most lower elevations, with mid to upper 80s for the Sierra valleys.

One other item of note is the possibility of smoke and haze from the Trailhead wildfire spreading across eastern CA-far western NV later today. For now, we will just mention some haze in eastern CA north of I-80 and south of Susanville, and far western NV just north of Reno. For more details, see the Aviation segment below. MJD

Long Term (Saturday Onward)...

Messaging focus will be on continued warm temperatures and drier flow for the holiday weekend into early next week. Pretty typical stuff for the beginning of July. No big changes made to the forecast.

Simulations have come into somewhat better agreement showing a weak upper trough along the west coast persisting into the middle of next week with a dry southwest flow aloft over the region. As a result thunderstorm chances are minimal, except perhaps some isolated cells in favored convergence zones. Predictability of these are too low this far out to include in the forecast. Temperatures will be slightly cooler compared to this week, but not by much with 500 mb heights remaining near to above normal.

Weak-moderate daily winds are expected through the period. One thing to watch is both GFS, ECMWF bring a more potent trough through the Pac NW next Tuesday-Wednesday which would increase the winds around our region, perhaps into critical fire weather levels. GEFS precipitable water plumes show the area drying out quite a bit too so some poor humidity levels are possible with the winds. -Chris

Aviation...

Generally VFR with typical weak-moderate late afternoon westerly winds through Friday. However as moisture aloft has increased we do expect isolated-scattered thunderstorms to develop each afternoon, early evening. These storms will produce MVFR ceilings and visibility, lightning, strong outflow winds, and possible blowing dust. Areas south of Highway 50 have the best chances of seeing impacts from thunderstorms.

For today, based on the latest NCAR convective resolving ensemble, we'll likely see storms initiate near MMH as early as 19-20z, with development further east and north, perhaps extending up along the Pine Nuts east of MEV, CXP by 22-00z. This simulation did quite well on thunderstorm coverage yesterday. I can't completely rule out cells near RNO but simulations keep activity over the Pine Nuts, Virginia Range well SE of the field. Note that our primary radar KRGX is out of service until likely early afternoon today.

Another item to mention is potential for smoke from the Trailhead wildfire east of Auburn to impact our region. If the fire continues to be active today, HYSPLIT simulations show light to moderate levels of smoke working into the Tahoe, Reno areas with the zephyr westerly wind, after 22z. While I won't put restrictions in the TAFs due to uncertainty, degraded flight visibility is possible between Reno and Sacramento over the Sierra with terrain obscuration. That is, again, assuming the fire remains active today. -Chris

&&

.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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427
FXUS65 KREV 292124
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
224 PM PDT WED JUN 29 2016

.SYNOPSIS...
Highs near 100 degrees are expected for lower elevations of western Nevada through Friday as high pressure remains over the Great Basin. A few thunderstorms are possible today and Thursday mainly south of Highway 50, with the threat of storms expanding farther north on Friday. Storms may linger into Saturday south of Highway 50, otherwise dry conditions are expected with temperatures remaining above average are expected for the holiday weekend.

&&

.SHORT TERM...
Isolated to scattered thunderstorms have formed over eastern Mono and western Mineral Counties so far this afternoon. At this time, development into the Pine Nuts looks less likely as the zephyr has begin across the Sierra Front. However, there is still a small threat for the east side of them so will leave them in. Otherwise, all areas east of 395 and south of 50 will see storms into the evening.

A weakness is expected to develop along the coast Thursday which will bring a little more southwest flow to the Sierra and Western NV. As a result, thunderstorm potential looks less tomorrow with less convergence and slightly less moisture. Temperatures will remain hot, with a decent late afternoon zephyr at least west of Highway 95.

Friday is a little more interesting as the weakness becomes a little better defined over California. The flow aloft will become more south bringing slightly more moisture and a more favorable direction for mtn convergence. Thunderstorms are possible most areas with the best coverage south of I-80 into Western NV. While the storms will be slow moving and capable of some brief heavy rains, the cores will likely be small. This may be a fire concern, see that section below. The other concern will be any potential debris flows from the Washington Fire (last year) and the Marina Fire. It won't take much heavy rain to create problems, especially for the Marina Fire. Wallmann

&&

.Long Term...Saturday through Wednesday...

Thought processes for the long term portion of the forecast have not changed with the latest cycle of guidance products...other than the possibility of convection Saturday.

With the medium range guidance models now maintaining the trough of low pressure west of the forecast area into Saturday evening the thinking goes that mid level moisture will not get swept out of the region quite as fast. Lingering instability with relative light flow in the mid levels should promote a slight chance of thunderstorms in the favored convergence area of Mono/Mineral County for Saturday. The atmosphere appears to be a little too dry by then for convection across the northern parts of the forecast area.

Flow aloft becomes more westerly with more drying by Sunday...then a low amplitude long wave trough develops west of the forecast area by Tuesday. The presence of this trough will allow high temperatures to cool a few degrees...but its main impact will be to cause increased pressure/thermal gradients over most of the forecast area. Gusty winds are very possible north of Highway 50 Monday and Tuesday with the strongest winds Tuesday. This is problematic as dry air will be in place so critical fire weather conditions are a possibility by then. 20

&&

.Aviation...

Mainly VFR through at least Friday...but we are expecting

thunderstorms will develop each afternoon and evening south of
Highway 50. These storms may develop farther north along the Sierra
Friday afternoon. With any storms gusty outflow winds are likely and
visibilities could be reduced in blowing dust away from the storms
and in brief moderate to heavy rain in the storms. The chance for
convection decreases each evening.

Smoke from wildfires in the area and to the south and west of the
area could cause periods of reduced visibilities both at the surface
and and aloft. Based on the current state and proximity of fires
near the area the chance for significant surface restrictions is
low. Flight level reductions may increase over the Sierra later
today and this evening if the Trailhead Fire becomes more active. 20

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.FIRE WEATHER...

Thunderstorms have developed this afternoon and in Mono, Mineral,
and southern Lyon Counties and are expected to continue to move
north later this afternoon to at least highway 50. Main concerns are
lightning strikes outside of rain cores and strong erratic outflow
winds. A decrease in storm coverage is expected Thursday, but some
model simulations are indicating possible region wide coverage in
storms on Friday. Fire weather products may need to be issued for
Friday but confidence in storm coverage is still low at this time.

For the weekend expect hot and dry conditions with the next period
of concern being an increase in wind early next week. -Zach

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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231
FXUS65 KREV 300331 AAA
AFDREV

Area Forecast Discussion...UPDATED
National Weather Service Reno NV
831 PM PDT WED JUN 29 2016

.UPDATE...

Showers and thunderstorms stayed mostly across southern Mono County northeastward into Mineral and eastern Churchill Counties this evening. Cells were slow moving with a few anchoring to the local terrain in southern Mono County where radar estimates exceeded one inch, although storms probably produced small hail as well. One storm moved southward along the eastern slopes of the White Mountains and produced some localized flooding around Oasis in the Fish Lake Valley with some mud and debris reported on area roadways. Storms have weakened although isolated cells continue to develop along local convergence in Mineral County, mainly south and east of Hawthorne. Activity should continue to decrease this evening.

Smoke from the Trailhead Fire has poured into the I-80 corridor and will likely stick around overnight as winds become light. BlueSky model runs indicate smoke transport will stop overnight and early Thursday which should allow for a period of mixing and improvement by midday or early afternoon Thursday. However, winds once again become favorable for smoke transport into the Reno-Tahoe area later in the afternoon and evening Thursday depending on fire activity. The smoke may have impacts on those with sensitivity to smoke as well as general aviation. Slantwise visibility will be reduced this evening. Hohmann

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.SYNOPSIS...
Highs near 100 degrees are expected for lower elevations of western Nevada through Friday as high pressure remains over the Great Basin. A few thunderstorms are possible today and Thursday mainly south of Highway 50, with the threat of storms expanding farther north on Friday. Storms may linger into Saturday before drier conditions return early next week.

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.PREVIOUS DISCUSSION... /Issued 224 PM PDT WED JUN 29 2016/

SYNOPSIS...
Highs near 100 degrees are expected for lower elevations of western Nevada through Friday as high pressure remains over the Great Basin. A few thunderstorms are possible today and Thursday mainly south of Highway 50, with the threat of storms expanding farther north on Friday. Storms may linger into Saturday south of Highway 50, otherwise dry conditions are expected with temperatures remaining above average are expected for the holiday weekend.

SHORT TERM...
Isolated to scattered thunderstorms have formed over eastern Mono and western Mineral Counties so far this afternoon. At this time, development into the Pine Nuts looks less likely as the zephyr has begin across the Sierra Front. However, there is still a small threat for the east side of them so will leave them in. Otherwise, all areas east of 395 and south of 50 will see storms into the evening.

A weakness is expected to develop along the coast Thursday which will bring a little more southwest flow to the Sierra and Western NV. As a result, thunderstorm potential looks less tomorrow with less convergence and slightly less moisture. Temperatures will remain hot, with a decent late afternoon zephyr at least west of Highway 95.

Friday is a little more interesting as the weakness becomes a little better defined over California. The flow aloft will become more south bringing slightly more moisture and a more favorable direction for mtn convergence. Thunderstorms are possible most areas with the best coverage south of I-80 into Western NV. While the storms will be slow moving and capable of some brief heavy

rains, the cores will likely be small. This may be a fire concern, see that section below. The other concern will be any potential debris flows from the Washington Fire (last year) and the Marina Fire. It won't take much heavy rain to create problems, especially for the Marina Fire. Wallmann

Long Term...Saturday through Wednesday...

Thought processes for the long term portion of the forecast have not changed with the latest cycle of guidance products...other than the possibility of convection Saturday.

With the medium range guidance models now maintaining the trough of low pressure west of the forecast area into Saturday evening the thinking goes that mid level moisture will not get swept out of the region quite as fast. Lingering instability with relative light flow in the mid levels should promote a slight chance of thunderstorms in the favored convergence area of Mono/Mineral County for Saturday. The atmosphere appears to be a little too dry by then for convection across the northern parts of the forecast area.

Flow aloft becomes more westerly with more drying by Sunday...then a low amplitude long wave trough develops west of the forecast area by Tuesday. The presence of this trough will allow high temperatures to cool a few degrees...but its main impact will be to cause increased pressure/thermal gradients over most of the forecast area. Gusty winds are very possible north of Highway 50 Monday and Tuesday with the strongest winds Tuesday. This is problematic as dry air will be in place so critical fire weather conditions are a possibility by then. 20

Aviation...

Mainly VFR through at least Friday...but we are expecting thunderstorms will develop each afternoon and evening south of Highway 50. These storms may develop farther north along the Sierra Friday afternoon. With any storms gusty outflow winds are likely and visibilities could be reduced in blowing dust away from the storms and in brief moderate to heavy rain in the storms. The chance for convection decreases each evening.

Smoke from wildfires in the area and to the south and west of the area could cause periods of reduced visibilities both at the surface and and aloft. Based on the current state and proximity of fires near the area the chance for significant surface restrictions is low. Flight level reductions may increase over the Sierra later today and this evening if the Trailhead Fire becomes more active. 20

FIRE WEATHER...

Thunderstorms have developed this afternoon and in Mono, Mineral, and southern Lyon Counties and are expected to continue to move north later this afternoon to at least highway 50. Main concerns are lightning strikes outside of rain cores and strong erratic outflow winds. A decrease in storm coverage is expected Thursday, but some model simulations are indicating possible region wide coverage in storms on Friday. Fire weather products may need to be issued for Friday but confidence in storm coverage is still low at this time.

For the weekend expect hot and dry conditions with the next period of concern being an increase in wind early next week. -Zach

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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593
FXUS65 KREV 300908
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
208 AM PDT THU JUN 30 2016

.SYNOPSIS...

Highs near 100 degrees are expected for lower elevations of western Nevada through Friday. A few thunderstorms are possible today mainly south of Highway 50, with the threat of storms expanding farther north on Friday as weak upper low approaches the Sierra. Storms may linger into Saturday before drier conditions return early next week.

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.SHORT TERM...

Main changes to the short term forecast include expansion of thunderstorm chances Friday and Saturday afternoon-evening, with a few showers lingering through Friday night.

For today, more stable air mass is expected with potential for isolated late day convection limited to Mineral-Mono and possibly far southeast portions of Lyon and Churchill counties. In these areas, some cells may produce around 0.25 inch of rainfall but fewer sites will receive rain compared to yesterday. The ridge will begin weakening with 500 mb heights and mixed layer temps a bit lower than yesterday, which could limit 100 degree highs to the warmer west central NV valleys. A weaker zephyr breeze with a later onset is projected today, with gusts generally below 25 mph.

By this evening, hazy conditions due to smoke from the Trailhead wildfire can be expected by this evening around the Reno-Tahoe vicinity and northern Sierra valleys, assuming that significant smoke plumes flare up again during the day. For additional details and impacts related to this smoke, see the Aviation segment below.

For Friday, upper low moving into central CA will spread increasing moisture and instability across much of the eastern Sierra and western NV. Some enhanced forcing with SE-S 500 mb flow is also possible near the Sierra by late afternoon, which could lead to stronger and longer lasting cells. These stronger cells may then evolve into a more organized cluster of storms spreading into far western NV through the evening, with some showers lingering into the late night. There are some timing differences among the guidance sources, but the overall trend seems to favor peak activity mainly between 5-9 pm. Most cells will be slow moving with a heavy rainfall and localized flooding threat, with gusty outflow winds and accumulating small hail also possible. The burn scar from the Marina fire near Lee Vining will be a high risk for significant debris flows possibly impacting US-395 for an extended period of time, even if lesser rainfall amounts occur there.

By Saturday, the low slides a bit farther south across east central CA and is expected to weaken, but it appears that conditions will remain favorable for another round of late day convection. Coverage is expected to be less compared to Friday, with most activity limited to areas from I-80 southward. We will still have to watch for heavy rainfall and localized flooding potential again due to slow movement of most cells.

The increased cloud cover and precip potential will lead to daytime highs edging downward a bit Friday through Saturday, but lows Friday night may be a few degrees warmer in areas not receiving substantial rainfall. MJD

.Long Term (Sunday Onward)...

Our impact messaging focus for next week will revolve around increased winds and risk for critical fire weather conditions. This may be of particular interest with potential lightning holdovers from storms the next couple days.

Guidance is in reasonable agreement showing a broad upper trough along the west coast with dry, stable southwest flow aloft over the

region. This should promote periods of enhanced winds, over the typical summer zephyr breezes. Tuesday, Wednesday look to be the most robust with gusts on the order of 30-35 kt, but that timing is likely to vary some in upcoming simulations.

With trough in the vicinity temperatures are likely to be a little cooler but not overly so with 700 mb temperatures near seasonal normals. Not anticipating much in the way of thunderstorms as guidance is showing fairly stable airmass with falling precipitable water values and lower humidity. Looking ahead to the following weekend, there are some signals for a resurgence of the Great Basin ridge which would warm things up considerably. -Chris

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.Aviation...

With a drier, more stable airmass over the region, risk of thunderstorms today is much less than yesterday. However Friday could see more widespread storms. Latest high-res guidance keeps most storms east of a MMH-WMC line today, with just typical afternoon, early evening westerly winds. For Friday, low pressure aloft moving overhead will promote a more unstable environment. That coupled with increasing moisture should result in scattered storms areawide during the afternoon, evening hours Friday. This could affect operations at RNO, MMH (30-40% chance) between 21z/Fri- 04z/Sat. Strong winds, lightning, heavy rain possible.

Smoke from the Trailhead fire east of SAC looks to continue impacting the region through tomorrow, assuming continued fire activity. Some light smoke, haze entrenched around RNO, TRK at the moment. Latest smoke simulations from Blue Sky, HYSPLIT show clearing this morning with mixing, but then light-moderate smoke and haze working back into TRK, TVL, RNO, CXP areas after 22z/Thurs. Generally thinking VFR conditions but can't rule out MVFR around Tahoe, TRK if the fire is particularly active today. Flight visibility between RNO-SAC will continue to be impacted with potential terrain obscuration. -Chris

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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862
FXUS65 KREV 302206
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
306 PM PDT THU JUN 30 2016

.SYNOPSIS...
A few thunderstorms are possible today south of Hawthorne, with the threat of storms expanding farther north on Friday as weak upper low approaches the Sierra. Storms will linger into Saturday before drier conditions return early next week. Temperatures will remain above normal, although a slight cooling trend is expected for the holiday weekend.

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.SHORT TERM...
The main concern the next 24 hours will be the potential convection Friday ahead of a weak upper low developing over Central California. Until then, a couple storms are possible south of Hawthorne early this evening. Also, the Trailhead Fire is very active again as of this writing so expect the smoke and haze to move into the Tahoe Basin and Sierra Front shortly before sunset. The smoke should slowly lift out again during the day tomorrow.

As mentioned above, thunderstorm potential for tomorrow is the biggest concern. With the weak upper low bringing a more south flow, some monsoon moisture will seep in. In addition, slight cooling aloft combined with continued hot temperatures will create quite a bit of instability. Increased the thunderstorm coverage with them developing during the early afternoon and continuing into the evening. They are expected to be most numerous south of I-80 and U.S. 395.

Storm mode was a concern due to the low levels still being quite dry despite the increased moisture. However, with slow storm motions, they are expected to be wet with only a few dry strikes outside cores. The concern then becomes flash flooding, especially near any burn scars. If any occurs it will be localized, but the biggest concern remains the Marina Fire where steep slopes cross 395 near Lee Vining. Gusty winds to 50 mph will also be likely with any storm as well as small hail.

The thunderstorms will diminish during the evening with a repeat possible Saturday. The models are slightly slower to move the upper low east so another day of isolated to scattered thunderstorms is expected, at least south of Susanville and Gerlach. The low then moves east with a more west flow aloft developing. The drier air and warmer temps aloft are expected to put a lid on any potential convection. Surface temps are also expected to cool slightly as ridge temps cool a few degrees. Wallmann

.Long Term (Monday Onward)...

Next week temperatures will return to near normal with increasing afternoon winds. Dry airmass and afternoon winds potentially gusting to 35 mph Tuesday and Wednesday will create fire weather concerns. This will be especially true considering winds will increase right after the 4th of July holiday weekend and widespread thunderstorms expected this Friday which could create hold over fires.

Broad trough over the Pacific Northwest will sag into northern CA/NV increasing surface gradients and moderating temperatures a bit. Main changes today were to cool high temperatures next week and continue to increase winds for Tues/Wed. The operational ECMWF has a less pronounced and more progressive trough that would result in less wind, however the GFS and ensembles from both GFS/ECMWF depict a deeper trough increasing confidence that conditions next week will be dry and windy. -Zach

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.Aviation...

A few thunderstorms have developed today in Mono and Mineral

counties east of KMMH. This trend is expected to continue as SW flow aloft continues to push a few pulse storms east with only a 10% chance of impacting KMMH.

Smoke from the Trailhead fire near Auburn will continue bring minor impacts to visibility in the central Sierra and western Nevada. Large smoke plume currently visible on satellite shows the fire is still quite active and will continue to push smoke and haze into the Tahoe Basin and western Nevada. Not currently expecting MVFR conditions but not out of the question at Sierra terminals.

Increasing moisture and instability is expected to bring region-wide thunderstorms on Friday. Storms will be possible at all major terminals (40% at KMMH, 30% at KCXP, KTVL, KRNO, and KTRK). Strong outflow winds, lightning, heavy rain and small hail will be possible. -Zach

.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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604
FXUS65 KREV 010437 CCA
AFDREV

Area Forecast Discussion...UPDATED
National Weather Service Reno NV
936 PM PDT THU JUN 30 2016

.UPDATE...

Showers and thunderstorms were waning this evening with lightning
potential very low now across Mono-Mineral Counties. Scattered
showers persist east of Hawthorne but should end by midnight. A
quick look at 00Z model data shows an active period Friday afternoon
and evening with some of the higher resolution models persistent in
producing a mesoscale complex along the eastern Sierra and then
quickly ejecting it into the Basin and Range. If this happens, it
would mitigate some of the heavy rain potential although stronger
storms will no doubt produce heavy rainfall. The NAM for the second
run in a row is showing a distinct outflow feature that could bring
strong south to southwest winds to the Horseshoe Fire and a round of
blowing dust to the Basin and Range Friday evening including KNFL-
KLOL. Hohmann

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.SYNOPSIS...
The threat of storms will expand farther north on Friday as a
weak upper low approaches the Sierra. Storms will linger into
Saturday before drier conditions return early next week.
Temperatures will remain above normal, although a slight cooling
trend is expected for the holiday weekend.

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.PREVIOUS DISCUSSION... /Issued 306 PM PDT THU JUN 30 2016/

SYNOPSIS...
A few thunderstorms are possible today south of Hawthorne, with
the threat of storms expanding farther north on Friday as weak
upper low approaches the Sierra. Storms will linger into Saturday
before drier conditions return early next week. Temperatures will
remain above normal, although a slight cooling trend is expected
for the holiday weekend.

SHORT TERM...
The main concern the next 24 hours will be the potential
convection Friday ahead of a weak upper low developing over
Central California. Until then, a couple storms are possible south
of Hawthorne early this evening. Also, the Trailhead Fire is very
active again as of this writing so expect the smoke and haze to
move into the Tahoe Basin and Sierra Front shortly before sunset.
The smoke should slowly lift out again during the day tomorrow.

As mentioned above, thunderstorm potential for tomorrow is the
biggest concern. With the weak upper low bringing a more south
flow, some monsoon moisture will seep in. In addition, slight
cooling aloft combined with continued hot temperatures will create
quite a bit of instability. Increased the thunderstorm coverage
with them developing during the early afternoon and continuing into
the evening. They are expected to be most numerous south of I-80
and U.S. 395.

Storm mode was a concern due to the low levels still being quite
dry despite the increased moisture. However, with slow storm
motions, they are expected to be wet with only a few dry strikes
outside cores. The concern then becomes flash flooding,
especially near any burn scars. If any occurs it will be
localized, but the biggest concern remains the Marina Fire where
steep slopes cross 395 near Lee Vining. Gusty winds to 50 mph will
also be likely with any storm as well as small hail.

The thunderstorms will diminish during the evening with a repeat
possible Saturday. The models are slightly slower to move the
upper low east so another day of isolated to scattered
thunderstorms is expected, at least south of Susanville and
Gerlach. The low then moves east with a more west flow aloft
developing. The drier air and warmer temps aloft are expected to
put a lid on any potential convection. Surface temps are also
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expected to cool slightly as ridge temps cool a few degrees.
Wallmann

Long Term (Monday Onward)...

Next week temperatures will return to near normal with increasing afternoon winds. Dry airmass and afternoon winds potentially gusting to 35 mph Tuesday and Wednesday will create fire weather concerns. This will be especially true considering winds will increase right after the 4th of July holiday weekend and widespread thunderstorms expected this Friday which could create hold over fires.

Broad trough over the Pacific Northwest will sag into northern CA/NV increasing surface gradients and moderating temperatures a bit. Main changes today were to cool high temperatures next week and continue to increase winds for Tues/Wed. The operational ECMWF has a less pronounced and more progressive trough that would result in less wind, however the GFS and ensembles from both GFS/ECMWF depict a deeper trough increasing confidence that conditions next week will be dry and windy. -Zach

Aviation...

A few thunderstorms have developed today in Mono and Mineral counties east of KMMH. This trend is expected to continue as SW flow aloft continues to push a few pulse storms east with only a 10% chance of impacting KMMH.

Smoke from the Trailhead fire near Auburn will continue bring minor impacts to visibility in the central Sierra and western Nevada. Large smoke plume currently visible on satellite shows the fire is still quite active and will continue to push smoke and haze into the Tahoe Basin and western Nevada. Not currently expecting MVFR conditions but not out of the question at Sierra terminals.

Increasing moisture and instability is expected to bring region-wide thunderstorms on Friday. Storms will be possible at all major terminals (40% at KMMH, 30% at KCXP, KTVL, KRNO, and KTRK). Strong outflow winds, lightning, heavy rain and small hail will be possible. -Zach

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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658
FXUS65 KREV 010945
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
245 AM PDT FRI JUL 1 2016

.SYNOPSIS...
Upper low approaching the Sierra will bring an increased threat for thunderstorms this afternoon and evening, with a few stronger storms possible. Storms will linger into Saturday before drier conditions return for the remainder of the holiday weekend. Temperatures will slowly cool down to near average by early next week, with increasing winds around the middle of next week.

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.SHORT TERM...

Today still looks like the most active day of the week for convection as upper low over northwest CA moves slowly southeast toward the Sierra. A few cells have even formed early this morning in southern Mono-Mineral Counties, possibly along an outflow boundary left behind from Thursday evening's convection.

Some enhanced forcing associated with a small deformation zone and SE-S 500 mb flow is also possible near the Sierra this afternoon, which could lead to stronger and longer lasting cells. These stronger cells may then evolve into a more organized cluster of storms spreading into parts of western NV through the evening, Mono and Alpine Counties appear to be the most favored location for storm development this afternoon, but some storms could also form in the Tahoe basin.

This evening, especially between 5 and 10 pm, could be quite active if several favorable ingredients come together. Most storms should push away from the Sierra crest by early evening, with the highest probability of a larger storm cluster forming around Mineral-Lyon-Churchill counties. Additional cells along US-395/I-580 including Reno-Carson City could also be in play, with late day zephyr breezes and outflow boundaries providing focus areas for additional cell formation. Stronger storms will contain heavy rainfall capable of localized flooding, small hail, gusty outflow winds and frequent lightning strikes.

Some of the 00Z guidance was suggesting the possibility of a large outflow boundary with winds strong enough to produce areas of blowing dust across the west central NV basin, where the ground has dried out sufficiently during this recent warm period. This could produce some travel impacts on portions of US-95 and I-80 including Fallon and Lovelock,

For Saturday, another round of showers and thunderstorms is expected, but coverage is more likely to be less compared to today. Most of the activity should remain south of US-50, with isolated cells possible farther north to near I-80. Drier and more stable air mass then spreads across all areas on Sunday, with a slight increase in afternoon breezes and temperatures edging down a bit, with highs mainly in the 90s for lower elevations,

Trailhead fire smoke and haze...By this evening, hazy conditions are possible around Reno-Sparks-Truckee northward across the Sierra Valley. Smoke trajectory model forecasts indicate a greater amount of haze and smoke for the late afternoon-evening hours on Saturday around the Reno-Tahoe regions due to an earlier onset of west breezes. All of these smoke/haze projections assume that significant smoke plumes flare up each day. MJD

.Long Term (4th of July Onward)...

Messaging focus - breezy, critical fire weather potential especially Tuesday, Wednesday.

Increased confidence in seeing periods of breezy conditions, critical fire weather next week as guidance is becoming more consistent in developing troughing over the Pac NW into N Cal. Of particular note is Tuesday, Wednesday where GFS, ECMWF showing -1 to -1.5 SD anomaly in 500 mb height fields over N Cal with 700 mb

flow nearing 30 kts. This period has the highest risk of seeing critical fire weather and impacts to existing fires, lightning holdovers with widespread gusts 30-40 mph if these simulations pan out. Monday (4th of July) may also be worth watching with a slightly enhanced thermal gradient and zephyr flow.

Temperatures won't be too hot with guidance indicating highs near early July averages. Also a relatively stable airmass overall next week is not too supportive of thunderstorms, except perhaps some isolated cells in the favored Lassen, Mono/Mineral convergence zones. -Chris

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.Aviation...

Thunderstorms are the main weather issue today though there are some differences in recent simulations, which result in some lowering forecast confidence. Overall environment looks favorable for scattered afternoon, evening storms in the region (SREF, GFS) but convective resolving guidance (HRRR, NCAR) keeps most of the storms along and east of a MMH-NFL-WMC line. The convective resolving models have done well the past few days. So....

In any event due to these discrepancies I will keep just VCTS in the TAFs and not get more specific with TEMPO or prevailing thunderstorms. There's about a 10-30% chance of storms impacting airfields including RNO, MMH between 21z/Fri-04z/Sat. Forecast soundings indicate a high risk of strong outflow winds, so we could see gusts 40kts+ with low level wind shear. Outflow boundaries will kick off new thunderstorms. Dust storms are a good bet around LOL,NFL,HTH with possible development of a larger thunderstorm complex in the evening. Frequent lightning and periods of heavy rain are also possible with any storms.

Isolated storms remain possible Saturday areawide, with much less risk Sunday, Monday as a drier and more stable airmass overspreads the region. Continued typical afternoon/evening westerly breezes. -Chris

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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732
FXUS65 KREV 012125
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
225 PM PDT FRI JUL 1 2016

.SYNOPSIS...
An upper low approaching the Sierra will bring thunderstorms this evening main to areas southeast of I-80. Storms will linger into Saturday before drier conditions return for the remainder of the holiday weekend. Temperatures will slowly cool down to near average by early next week, with increasing winds around the middle of next week.

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.DISCUSSION...
Thunderstorms are firing south of Yerington and east of Highway 395 early this afternoon. This is in line with convection allowing models. For this evening, expect more storms to fire, and those same models keep the storms there and also along and east of Highway 95 further north towards Lovelock. This idea looks good as the zephyr has kicked in at the crest and will kill any threat for storms there.

The one adjustment is to keep the scattered mention in for the Sierra Front. Outflows from the storms to the southeast may interact with the zephyr over the front and trigger storms early this evening. Not a high confidence situation, but I have seen this enough times to keep the forecast going as is there for now. The biggest threats from the storms will be gusty winds and brief heavy rainfall.

The low only slowly pulls east Saturday with more storms possible. If anything, it looks less, and more confined to the southeast as warmer air aloft moves in over the Sierra Front. Temperatures will remain warm, but continue the slow cooling trend.

For the rest of the holiday weekend, a more west flow will develop and push any moisture east. In addition, temps aloft also fall at all levels which will keep the slow cooling trend going. A typical zephyr is expected Sunday before a little strong wind is possible Monday as the flow aloft increases slightly.

The rest of next week looks breezy as a couple short waves pass by to the north and into Oregon. There is little moisture this far south so do not expect much except some high clouds. However, they will act to increase the winds aloft with breezy days Tuesday and Wednesday. With continued low humidity, fire weather concerns are there despite temps cooling back to near average for early July. Thursday and Friday, the winds aloft relax as the upper trough over the Pacific Northwest weakens. Temperatures will remain near average as temps aloft only very slowly begin to warm. Wallmann

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.Aviation...

Latest convective-resolving models have trended lower for thunderstorm threats this afternoon and evening. They still show a threat for outflow winds across Mineral and Churchill Counties this afternoon possibly spreading north into Pershing County after 00z. However, they show peak outflow gusts up to 35 kts, weaker than earlier simulations. This also lowers the threat for blowing dust but there is still a 20% chance for lowered visibility due to dust across western NV, including at LOL, NFL, and HTH.

Thunderstorm chances at terminals have become much lower as well this afternoon and evening with only a 10% chance at TVL and TRK and 10-30% chance for western NV terminals.

Isolated storms remain possible Saturday, mainly south of I-80, with much less risk Sunday and Monday as a drier and more stable airmass overspreads the region. Continued typical afternoon/evening westerly breezes through the weekend. JCM

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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360
FXUS65 KREV 020420 AAA
AFDREV

Area Forecast Discussion...UPDATED
National Weather Service Reno NV
920 PM PDT FRI JUL 1 2016

.UPDATE...
Main thunderstorm complex developed over the higher terrain of central NV and propagated southward into southern NV this evening. Storms across western NV were weaker due to lack of shear and larger scale forcing. Still, surface heating and outflow from cells that developed this afternoon and evening were sufficient to produce a few stronger storms with wind gusts around 40-45 mph, locally heavy rain and blowing dust in the Basin and Range around KNFL-KLOL. Visibility dropped as low as 3/4 mile at KLOL. Activity was decreasing with a few storms expected to hold together mainly in the Basin and Range through the evening. A quick look at the 00Z model data shows little change in forecast thinking for Saturday. Weakness will be moving slowly eastward across the region with another round of isold-sct showers and thunderstorms, again most south of Hwy 50 and east of Reno. Hohmann

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.SYNOPSIS...
An upper low will continue to bring the threat for thunderstorms Saturday before drier conditions return for the remainder of the holiday weekend. Temperatures will slowly cool down to near average by early next week, with increasing winds around the middle of next week.

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.PREVIOUS DISCUSSION... /Issued 225 PM PDT FRI JUL 1 2016/

SYNOPSIS...
An upper low approaching the Sierra will bring thunderstorms this evening main to areas southeast of I-80. Storms will linger into Saturday before drier conditions return for the remainder of the holiday weekend. Temperatures will slowly cool down to near average by early next week, with increasing winds around the middle of next week.

DISCUSSION...
Thunderstorms are firing south of Yerington and east of Highway 395 early this afternoon. This is in line with convection allowing models. For this evening, expect more storms to fire, and those same models keep the storms there and also along and east of Highway 95 further north towards Lovelock. This idea looks good as the zephyr has kicked in at the crest and will kill any threat for storms there.

The one adjustment is to keep the scattered mention in for the Sierra Front. Outflows from the storms to the southeast may interact with the zephyr over the front and trigger storms early this evening. Not a high confidence situation, but I have seen this enough times to keep the forecast going as is there for now. The biggest threats from the storms will be gusty winds and brief heavy rainfall.

The low only slowly pulls east Saturday with more storms possible. If anything, it looks less, and more confined to the southeast as warmer air aloft moves in over the Sierra Front. Temperatures will remain warm, but continue the slow cooling trend.

For the rest of the holiday weekend, a more west flow will develop and push any moisture east. In addition, temps aloft also fall at all levels which will keep the slow cooling trend going. A typical zephyr is expected Sunday before a little strong wind is possible Monday as the flow aloft increases slightly.

The rest of next week looks breezy as a couple short waves pass by to the north and into Oregon. There is little moisture this far south so do not expect much except some high clouds. However, they will act to increase the winds aloft with breezy days Tuesday and Wednesday. With continued low humidity, fire weather concerns are there despite temps cooling back to near average for early July.

Thursday and Friday, the winds aloft relax as the upper trough over the Pacific Northwest weakens. Temperatures will remain near average as temps aloft only very slowly begin to warm. Wallmann

Aviation...

Latest convective-resolving models have trended lower for thunderstorm threats this afternoon and evening. They still show a threat for outflow winds across Mineral and Churchill Counties this afternoon possibly spreading north into Pershing County after 00z. However, they show peak outflow gusts up to 35 kts, weaker than earlier simulations. This also lowers the threat for blowing dust but there is still a 20% chance for lowered visibility due to dust across western NV, including at LOL, NFL, and HTH.

Thunderstorm chances at terminals have become much lower as well this afternoon and evening with only a 10% chance at TVL and TRK and 10-30% chance for western NV terminals.

Isolated storms remain possible Saturday, mainly south of I-80, with much less risk Sunday and Monday as a drier and more stable airmass overspreads the region. Continued typical afternoon/evening westerly breezes through the weekend. JCM

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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583
FXUS65 KREV 020951
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
251 AM PDT SAT JUL 2 2016

.SYNOPSIS...
An upper low will continue to bring the threat for thunderstorms mainly south of Highway 50 today, before drier conditions return for the remainder of the holiday weekend. Temperatures will slowly cool down to near average by early next week, with increasing winds around the middle of next week.

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.SHORT TERM...

Main change to the short term forecast was increasing the haze and smoke areas today and Sunday as the Trailhead fire west of the Sierra crest is likely to burn actively for at least the next couple of days. Winds will become more favorable for spreading smoke across the I-80 corridor into Reno-Sparks and northward into the Sierra Valley and southern Lassen County from mid-afternoon through much of the evening, and eastward into parts of the West Central NV Basin and Range. The Tahoe basin should be spared from the worst of the smoke through Sunday, but some haze will likely be visible, especially from the north shores. After Sunday, narrower but more concentrated smoke plumes are probable as winds increase further, but there is a larger degree of uncertainty as to which locations would be affected the most, and how active the fire will be by then.

The upper low which brought the thunderstorms, gusty outflow winds and areas of blowing dust to west central NV yesterday is projected to slide farther south today, shifting the primary focus for convection to areas south of US-50 this afternoon and evening. Mono County looks to be at a greater risk for thunderstorms today. While most storms should move at a moderate pace to the east or northeast, some cells could anchor to a terrain feature and persist for a longer duration, so the threat for heavy rainfall and localized flooding can't be ruled out (especially for sensitive burn scar areas).

Isolated cells may develop farther north to near I-80 with outflow interactions and convergence with late day zephyr, but instability will be limited so if any cells manage to form this far north, they would likely be short lived.

For Sunday, this low will weaken further while dry and more stable air mass spreads southward. Some buildups are still possible across Mono and Mineral Counties but thunderstorm potential is low. Winds increase a bit with some gusts of 30-35 mph possible especially north of I-80.

For Monday, dry and stable conditions prevail while increasing west flow will continue the slow upward trend for afternoon winds, with gusts near 35 mph in most areas. Temperatures will slowly cool down to near average with highs in the lower-mid 90s for most lower elevations. MJD

.Long term...Tuesday through Friday...

Low pressure pushes into the Pacific Northwest next week, with increasing winds across the area. Forecaster confidence continues to increase regarding breezy/dry conditions for next week.

Dry southwest flow aloft will increase Tuesday and Wednesday and potentially lead to critical fire weather conditions across much of the area, especially in the Eastern Sierra of Mono County and in Western Nevada where fuels have become critically dry. The low pressure will also bring lower heights and cooler temperatures aloft which will ease the temperatures back to near average for this time of year, with 80s and low 90s across the valleys. This will be a much welcomed reprieve from the hot temperatures we've been seeing, although the increasing winds and dry conditions will be important to watch, especially if there are any ongoing fires. Near normal temperatures and breezy conditions are expected to

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continue through the rest of the week as additional shortwaves
move through the Pacific Northwest. Hoon

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.Aviation...

Isolated storms expected this afternoon and evening, mainly south of
I-80 and east of Highway 395. The best chances for thunderstorms
today will be at KMMH and KBAN (a 30% chance). Further north
at KRNO/KCXP/KNFL/KHTH there is a lesser 10-20% chance of
thunderstorms. Thunderstorms may be capable of producing frequent
lightning, periods of heavy rainfall, small hail and gusty
outflow winds up to 40 kts. Blowing dust may be a possibility
this afternoon at KNFL/KLOL/KHTH.

Much less risk Sunday and Monday as a drier and more stable airmass
overspreads the region. Continued typical afternoon/evening westerly
breezes through the weekend. Smoke from the Trailhead Fire west of
Lake Tahoe will likely impact the area into next week with minor
reductions in visibility. JCM/Hoon

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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For more information from the National Weather Service visit...
http://weather.gov/reno
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547
FXUS65 KREV 022053
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
153 PM PDT SAT JUL 2 2016

.SYNOPSIS...
An upper low will continue to bring the threat for thunderstorms mainly south of Highway 50 today, before drier conditions return for the remainder of the holiday weekend. Temperatures will slowly cool down to near average by early next week, with increasing winds around the middle of next week.

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.DISCUSSION...
Few changes made to the forecast as convection is firing again this afternoon south of highway 50. We do not expect it to move as far north as yesterday as upper levels have stabilized a bit there, but isolated convection remains possible up to I-80. The thunderstorms should diminish this evening with the loss of heating.

No thunderstorms are expected on Sunday and the remainder of the holiday weekend as the weakness over the Sierra moves east. Upper levels will warm while the low levels slightly cool stabilizing the airmass. In addition, a more west flow at all levels will push the limited moisture east. With the west flow aloft, an afternoon zephyr can be expected Sunday and Monday afternoons.

Smoke the next couple days will be dependent on the Trailhead Fire. Yesterday's is starting to slowly mix out, but more is on the way as another decent plume is present on visible satellite. In addition, the IR signature is a little hotter so expect more smoke earlier in the evening with a more favorable wind direction. Added smoke, and not just haze, for the I-80 corridor where it is anticipated to be the most dense. A repeat is possible tomorrow, but will just keep as haze to see how much progress is made with fighting it.

As we move into next week, a trough will be over the Pacific Northwest which will increase winds aloft. Short waves moving through Tuesday and Wednesday will bring breezy conditions, more in the Fire Weather section below. Temperatures will also cool closer to average for early July. The trough moves east Thursday with lighter winds, but another trough is possible Friday/Saturday for more breezy conditions. This is less certain, but with a general west to southwest flow, it will be dry. Temperatures are also likely to hover near average. Wallmann

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.AVIATION...
Isolated to scattered thunderstorms will continue through 05Z this evening south of I-80. Biggest threats will be to KLOL and KNFL with a 10-20% chance of a storm hitting, but outflow gusts to 30 kts are possible from nearby storms. Otherwise, only a 5% chance for storms to affect KRNO/KCXP/KMMH this evening. VFR conditions otherwise.

Beginning Sunday, west flow will start to increase, but peak gusts from the W-SW will only be 20 kts, and 25 kts Monday. Stronger gusts to 30 kts are possible Tuesday for KRNO/KCXP/KMMH, but still some uncertainty as to how strong they will be. Still VFR then as skies will be mainly clear. Wallmann

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.FIRE WEATHER...

Main concern for this week is a few days of breezy afternoon winds and potential for critical conditions on Tuesday. Minimum humidity will be near and below 15% most of the week. For Sunday, looking at the typical afternoon zephyr breezes with peak gusts below 30 mph for the Sierra Front.

Monday to Wednesday, low pressure will move into the Pacific Northwest with a trough digging along the west coast for Tuesday. Peak gusts Monday should reach 30 mph along the Sierra Front and perhaps as high as 35 mph on Tuesday leading to an increased threat for critical fire weather conditions. Simulations push the trough overhead on Wednesday with continued breezy winds, but a tad lighter than Tuesday.

A second low is forecast to approach the Pacific Northwest coast Friday and Saturday, which may lead to another day or two of breezy winds and critical fire weather conditions. Brong

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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801
FXUS65 KREV 030251 AAA
AFDREV

Area Forecast Discussion...UPDATED
National Weather Service Reno NV
751 PM PDT SAT JUL 2 2016

.UPDATE...

The boundary layer has been well worked over from convection and only isolated showers are expected across the Basin and Range down into Mineral and southern Mono County near the White Mountains for the next few hours. No additional heavy rain or strong outflow winds are anticipated as upper low begins to pull away and heating subsides. The flash flood threat for the Marina burn area has ended while a flash flood warning will remain in effect for the White Mountains as the potential for debris flow in the steep terrain will persist as a result of earlier heavy rainfall. Updates have been issued. Hohmann

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.SYNOPSIS...
A drier weather pattern will get underway the rest of this holiday weekend as westerly flow pushes moisture out of the region. Temperatures will gradually cool to near average as winds increase early week.

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.PREVIOUS DISCUSSION... /Issued 153 PM PDT SAT JUL 2 2016/

SYNOPSIS...
An upper low will continue to bring the threat for thunderstorms mainly south of Highway 50 today, before drier conditions return for the remainder of the holiday weekend. Temperatures will slowly cool down to near average by early next week, with increasing winds around the middle of next week.

DISCUSSION...
Few changes made to the forecast as convection is firing again this afternoon south of highway 50. We do not expect it to move as far north as yesterday as upper levels have stabilized a bit there, but isolated convection remains possible up to I-80. The thunderstorms should diminish this evening with the loss of heating.

No thunderstorms are expected on Sunday and the remainder of the holiday weekend as the weakness over the Sierra moves east. Upper levels will warm while the low levels slightly cool stabilizing the airmass. In addition, a more west flow at all levels will push the limited moisture east. With the west flow aloft, an afternoon zephyr can be expected Sunday and Monday afternoons.

Smoke the next couple days will be dependent on the Trailhead Fire. Yesterday's is starting to slowly mix out, but more is on the way as another decent plume is present on visible satellite. In addition, the IR signature is a little hotter so expect more smoke earlier in the evening with a more favorable wind direction. Added smoke, and not just haze, for the I-80 corridor where it is anticipated to be the most dense. A repeat is possible tomorrow, but will just keep as haze to see how much progress is made with fighting it.

As we move into next week, a trough will be over the Pacific Northwest which will increase winds aloft. Short waves moving through Tuesday and Wednesday will bring breezy conditions, more in the Fire Weather section below. Temperatures will also cool closer to average for early July. The trough moves east Thursday with lighter winds, but another trough is possible Friday/Saturday for more breezy conditions. This is less certain, but with a general west to southwest flow, it will be dry. Temperatures are also likely to hover near average. Wallmann

AVIATION...
Isolated to scattered thunderstorms will continue through 05Z this evening south of I-80. Biggest threats will be to KLOL and KNFL with a 10-20% chance of a storm hitting, but outflow gusts to 30

kts are possible from nearby storms. Otherwise, only a 5% chance for storms to affect KRNO/KCXP/KMMH this evening. VFR conditions otherwise.

Beginning Sunday, west flow will start to increase, but peak gusts from the W-SW will only be 20 kts, and 25 kts Monday. Stronger gusts to 30 kts are possible Tuesday for KRNO/KCXP/KMMH, but still some uncertainty as to how strong they will be. Still VFR then as skies will be mainly clear. Wallmann

FIRE WEATHER...

Main concern for this week is a few days of breezy afternoon winds and potential for critical conditions on Tuesday. Minimum humidity will be near and below 15% most of the week. For Sunday, looking at the typical afternoon zephyr breezes with peak gusts below 30 mph for the Sierra Front.

Monday to Wednesday, low pressure will move into the Pacific Northwest with a trough digging along the west coast for Tuesday. Peak gusts Monday should reach 30 mph along the Sierra Front and perhaps as high as 35 mph on Tuesday leading to an increased threat for critical fire weather conditions. Simulations push the trough overhead on Wednesday with continued breezy winds, but a tad lighter than Tuesday.

A second low is forecast to approach the Pacific Northwest coast Friday and Saturday, which may lead to another day or two of breezy winds and critical fire weather conditions. Brong

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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019
FXUS65 KREV 030930
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
230 AM PDT SUN JUL 3 2016

.SYNOPSIS...
Dry and breezy conditions will prevail for the upcoming week. Smoke and haze from the Trailhead fire will move across much of the region each afternoon and evening through the holiday weekend, and may continue beyond the weekend. A slow cooling trend continues with daytime temperatures near average starting Tuesday.

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.SHORT TERM...

Several days of dry and breezy conditions are expected across the eastern Sierra and western NV, as the upper low that produced thunderstorms in recent days exits to the south and weakens.

The main weather impact for the next few days will be smoke from the Trailhead wildfire spreading east of the Sierra crest each afternoon and evening. This fire has been consuming several hundred acres of dense timber each day in steep rugged terrain, creating challenging conditions for fire suppression efforts. We have extended mention of smoke and haze to Monday for now, but smoke from this fire could be with us for a while. Trajectory models indicate the highest concentrations of smoke affecting the Reno-Carson-Tahoe regions each day, then spreading into portions of the NV Basin and Range and Mineral-Lyon Counties each evening, producing reduced air quality. People sensitive to these smoky conditions should take extra precautions and limit outdoor activity, especially during the late afternoon and evening hours.

For today, high temperatures in the mid to upper 90s for lower elevations and 80s near the Sierra are expected, followed by about 2-3 degrees of cooling each day through Tuesday. Wind speeds today will be typical zephyr breezes with gusts generally 25-30 mph, followed by a slow upward trend each day through Tuesday. For more details on wind speeds and associated impacts this week, see the Fire Weather section below. MJD

.LONG TERM...Wednesday through Saturday...

Low pressure over the Pacific Northwest will keep lower heights over CA/NV through the week, with temperatures near average for early July. Models have been in good agreement over the last several days, so forecaster confidence is good that we will see cooler and breezy conditions through the extended. A stronger low will move into the Pacific NW Friday into Saturday, with gusty winds and dry conditions again over the Sierra and western Nevada. Still some uncertainty on the strength of the winds for Friday-Saturday, but we'll have to keep an eye on this for potentially critical fire weather conditions. Hoon

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.AVIATION...

West flow will start to increase today, but peak gusts from the W-SW will only be near 20 kts, and then around 25 kts Monday. Stronger gusts to 30 kts are possible Tuesday for KRNO/KCXP/KMMH. VFR conditions as skies will be mainly clear, with the exception of light smoke/haze around Tahoe and Reno from the Trailhead Fire west of Tahoe. Hoon

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.FIRE WEATHER...

Main concern for the week is a few days of breezy afternoon winds and potential for critical conditions on Tuesday. Although temperatures will be cooler (close to normal for early July), the minimum humidity will be near and below 15% most of the week. For today, looking at the typical afternoon zephyr breezes with peak

gusts below 30 mph for the Sierra Front.

Monday to Wednesday, low pressure will move into the Pacific Northwest with a trough digging along the west coast for Tuesday. Peak gusts Monday should reach 30 mph along the Sierra Front and perhaps as high as 35 mph on Tuesday leading to an increased threat for critical fire weather conditions. Simulations push the trough overhead on Wednesday with continued breezy winds, but a tad lighter than Tuesday.

A second low is forecast to approach the Pacific Northwest coast Friday and Saturday, which may lead to another day or two of breezy winds and potential for critical fire weather conditions. Brong/Hoon

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.REV Watches/Warnings/Advisories...
NV...None.
CA...None.
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441
FXUS65 KREV 031726
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
1026 AM PDT SUN JUL 3 2016

.UPDATE...
Models remain consistent with the breezy winds and low humidity for the next few days. Peak afternoon gusts will be near 30 mph, which will bring increased fire danger and choppy conditions to area lakes.

On Tuesday, low pressure passing through the Pacific Northwest should kick the peak afternoon winds to 30-35 mph for much of western Nevada along and north of US-50. Have gone ahead and issued a Fire Weather Watch for the Sierra Front eastward into Pershing and Churchill counties.

A strong low may move into the region Friday and Saturday, with cooler but windy conditions for next weekend. Afternoon Highs may dip down into the low 80s for western Nevada with upper 60s and 70s for the Sierra. Brong

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.SYNOPSIS...
Dry and breezy conditions will prevail for the upcoming week. Smoke and haze from the Trailhead fire will move across much of the region each afternoon and evening through the holiday weekend, and may continue beyond the weekend. A slow cooling trend continues with daytime temperatures near average starting Tuesday.

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.PREVIOUS DISCUSSION... /Issued 230 AM PDT SUN JUL 3 2016/

SHORT TERM...

Several days of dry and breezy conditions are expected across the eastern Sierra and western NV, as the upper low that produced thunderstorms in recent days exits to the south and weakens.

The main weather impact for the next few days will be smoke from the Trailhead wildfire spreading east of the Sierra crest each afternoon and evening. This fire has been consuming several hundred acres of dense timber each day in steep rugged terrain, creating challenging conditions for fire suppression efforts. We have extended mention of smoke and haze to Monday for now, but smoke from this fire could be with us for a while. Trajectory models indicate the highest concentrations of smoke affecting the Reno-Carson-Tahoe regions each day, then spreading into portions of the NV Basin and Range and Mineral-Lyon Counties each evening, producing reduced air quality. People sensitive to these smoky conditions should take extra precautions and limit outdoor activity, especially during the late afternoon and evening hours.

For today, high temperatures in the mid to upper 90s for lower elevations and 80s near the Sierra are expected, followed by about 2-3 degrees of cooling each day through Tuesday. Wind speeds today will be typical zephyr breezes with gusts generally 25-30 mph, followed by a slow upward trend each day through Tuesday. For more details on wind speeds and associated impacts this week, see the Fire Weather section below. MJD

LONG TERM...Wednesday through Saturday...

Low pressure over the Pacific Northwest will keep lower heights over CA/NV through the week, with temperatures near average for early July. Models have been in good agreement over the last several days, so forecaster confidence is good that we will see cooler and breezy conditions through the extended. A stronger low will move into the Pacific NW Friday into Saturday, with gusty winds and dry conditions again over the Sierra and western Nevada. Still some uncertainty on the strength of the winds for Friday-Saturday, but we'll have to keep an eye on this for potentially critical fire weather conditions. Hoon

AVIATION...

West flow will start to increase today, but peak gusts from the W-SW will only be near 20 kts, and then around 25 kts Monday. Stronger gusts to 30 kts are possible Tuesday for KRNO/KCXP/KMMH. VFR conditions as skies will be mainly clear, with the exception of light smoke/haze around Tahoe and Reno from the Trailhead Fire west of Tahoe. Hoon

FIRE WEATHER...

Main concern for the week is a few days of breezy afternoon winds and potential for critical conditions on Tuesday. Although temperatures will be cooler (close to normal for early July), the minimum humidity will be near and below 15% most of the week. For today, looking at the typical afternoon zephyr breezes with peak gusts below 30 mph for the Sierra Front.

Monday to Wednesday, low pressure will move into the Pacific Northwest with a trough digging along the west coast for Tuesday. Peak gusts Monday should reach 30 mph along the Sierra Front and perhaps as high as 35 mph on Tuesday leading to an increased threat for critical fire weather conditions. Simulations push the trough overhead on Wednesday with continued breezy winds, but a tad lighter than Tuesday.

A second low is forecast to approach the Pacific Northwest coast Friday and Saturday, which may lead to another day or two of breezy winds and potential for critical fire weather conditions. Brong/Hoon

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.REV Watches/Warnings/Advisories...
NV...Fire Weather Watch from Tuesday afternoon through Tuesday evening NVZ450-453.

CA...None.
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299
FXUS65 KREV 032108
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
208 PM PDT SUN JUL 3 2016

.SYNOPSIS...
Dry and breezy conditions will prevail for the upcoming week. Smoke and haze from the Trailhead fire will move across much of the region each afternoon and evening into the fourth. A slow cooling trend continues with daytime temperatures near average starting Tuesday.

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.DISCUSSION...
Few changes were made to the forecast overall at least in the first half of the week. A trough will develop over the Pacific Northwest and bring a west flow to the Sierra and Western Nevada. The trough will bring breezy afternoons each day with the strongest winds for the first half of the week on Tuesday. Peak gusts around 35 mph are possible with a few gusts to 40 mph in windier locations. Otherwise, peak gusts of around 30 mph are expected Monday and Wednesday.

Temperatures will continue to slowly cool as this trough moves in with highs dropping to near average. Highs around 90 in Western NV with 75-80 degrees in the Sierra will be common through midweek. Overnight temperatures will also be quite cool with dry air in place. A few of the colder Sierra valleys may drop to near or below freezing.

Late in the week into next weekend, the models are coming around to the trough deepening even more. Winds look to increase again Friday and possibly become stronger next weekend. While the timing and strength of the trough differs a bit in the GFS/EC/ensembles, they all show the deeper trough. How high the winds get depends on the exact timing and depth of the trough with the strongest solutions indicating gusts of 45+ mph. In addition to the gusty winds, temperatures will also cool to below average. Wallmann

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.AVIATION...
VFR conditions through Wednesday. Smoke and haze from the Trailhead Fire will continue into at least Monday afternoon although we do not expect a significant reduction in visibility. SW-W winds will occur each afternoon and evening with peak gusts to 25 kts through Wednesday for all terminals. Slightly stronger gusts to 30 kts are likely Tuesday afternoon and evening. Wallmann

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.FIRE WEATHER...

* Fire Weather Watch Tuesday for much of western Nevada
* Breezy and dry week ahead, especially along the Sierra Front
* Cooler and windy possible for next weekend

Main concern for the week is a few days of breezy afternoon winds and potential for critical conditions for the Sierra Front on Tuesday. Although temperatures will be cooler (close to normal for early July), the minimum humidity will be near and below 15% most of the week.

Monday to Wednesday, low pressure will move into the Pacific Northwest with a trough digging along the west coast for Tuesday. Peak gusts Monday should reach 30 mph along the Sierra Front and as high as 35 mph on Tuesday leading to a higher potential for critical fire weather conditions. Simulations push the trough overhead on Wednesday with continued breezy winds, but a tad lighter than Tuesday.

A stronger and colder low is forecast to approach the Pacific Northwest coast Friday and Saturday, which may lead to a day or two of stronger winds and critical fire weather conditions next weekend. Brong

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.REV Watches/Warnings/Advisories...
NV...Fire Weather Watch from Tuesday afternoon through Tuesday
     evening NVZ450-453.

CA...None.
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For more information from the National Weather Service visit...
http://weather.gov/reno
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473
FXUS65 KREV 041024
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
324 AM PDT MON JUL 4 2016

.SYNOPSIS...

Dry and breezy conditions will prevail for the upcoming week. Smoke and haze from the Trailhead fire will move across much of the region each afternoon and evening into the fourth. A slow cooling trend continues with daytime temperatures near average starting Tuesday.

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.SHORT TERM...

Not much has changed in the central message for the early portion of this week; conditions will be dry and breezy bringing very isolated fire weather concerns today and much broader concerns for Tuesday. Please see the Fire Weather section below for a more thorough discussion of fire weather concerns.

Additionally, area lakes will be quite choppy for the holiday and even more so on Tuesday continuing into Wednesday. Lake conditions will likely change abruptly each afternoon as the afternoon zephyr kicks in. Prepare for choppy lakes if planning to be on the water.

Also, keep in mind, lake temperatures are much colder than the air temperature. With Lake Tahoe at nearly 62 degrees, hypothermia could begin to occur in less than 30 minutes for adults and even more quickly for children. At these temperatures, the threat of cold shock is present as well. Sudden immersion into colder lakes could cause incapacitation; alcohol intensifies these effects. It is strongly recommended that everyone wear a personal flotation device if out on area lakes.

Otherwise, temperatures will slowly trend lower each day as troughing brings marginally cooler flow over the region. Expect temperatures to be around seasonal averages in the mid/upper 80s to around 90 degrees for western nevada and 10 degrees cooler for Sierra valleys through mid week. Boyd

.Long term...Thursday through Sunday...

Models continue to trend a deeper trough moving into the Pacific Northwest Friday through Sunday. This will mean that winds will increase going into the weekend, along with cooling temperatures back down to below average. There are still some differences and uncertainties in the forecast regarding wind speeds and cooling, but indications are definitely showing a better potential for gusty winds next weekend that would lead to choppy lake conditions and potentially critical fire weather. Hoon

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.Aviation...

Winds wills will continue to increase over the next couple days with SW-W gusts around 25-30kts, especially Tuesday afternoon and evening. Smoke and haze from the Trailhead Fire west of Tahoe will also filter into the area, although no restrictions to visibility are expected. Hoon

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.FIRE WEATHER...

* Fire Weather Watch Tuesday for much of western Nevada
* Breezy and dry week ahead, especially along the Sierra Front
* Cooler and windy possible for next weekend

Main concern for the week is a few days of breezy afternoon winds and potential for critical conditions for the Sierra Front on Tuesday. Although temperatures will be cooler (close to normal for early July), the minimum humidity will be near and below 15% most of the week.

Monday to Wednesday, low pressure will move into the Pacific Northwest with a trough digging along the west coast. Peak gusts today should reach near 30 mph along the Sierra Front, with a few locations seeing localized critical conditions. By Tuesday wind gusts will increase even more, reaching and as high as 35 mph and leading to a higher potential for critical fire weather conditions. Simulations push the trough overhead on Wednesday with continued breezy winds, but a tad lighter than Tuesday.

A stronger and colder low is forecast to approach the Pacific Northwest coast Friday through Sunday, which may lead to another period of stronger winds and critical fire weather conditions. Brong/Hoon

.REV Watches/Warnings/Advisories...
NV...Fire Weather Watch from Tuesday afternoon through Tuesday evening NVZ450-453.

CA...None.
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683
FXUS65 KREV 041625
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
925 AM PDT MON JUL 4 2016

.UPDATE...Fire Weather...

Latest forecast guidance is similar to previous cycles in that the upper level jet should be placed over the northern third of the forecast area on Tuesday. This will place the best chances for increased wind gusts in the afternoon along and north of Highway 50. Thus...we have opted to upgrade the Fire Weather Watch to a Red Flag Warning for Tuesday for zones 450 and 453.

Farther south there could be isolated areas along Highway 395 in Mono County that see occasional gusts over 30 mph. The same is true for areas along Highway 95 in Mineral County. But the stronger winds should be confined to more typical wind prone areas with the bulk of those zones gusting to around 25 mph. If the upper jet were to slide a bit farther south those areas would be far more inclined to gust over 35 mph over a greater area. This will need to be watched and if there is a need for adding those zones to the Red Flag we will do so by Tuesday morning. 20

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.SYNOPSIS...

Dry and breezy conditions will prevail for the upcoming week. Smoke and haze from the Trailhead fire will move across much of the region each afternoon and evening through the week. A slow cooling trend continues with daytime temperatures near average starting Tuesday.

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.PREVIOUS DISCUSSION... /Issued 324 AM PDT MON JUL 4 2016/

SYNOPSIS...

Dry and breezy conditions will prevail for the upcoming week. Smoke and haze from the Trailhead fire will move across much of the region each afternoon and evening into the fourth. A slow cooling trend continues with daytime temperatures near average starting Tuesday.

SHORT TERM...

Not much has changed in the central message for the early portion of this week; conditions will be dry and breezy bringing very isolated fire weather concerns today and much broader concerns for Tuesday. Please see the Fire Weather section below for a more thorough discussion of fire weather concerns.

Additionally, area lakes will be quite choppy for the holiday and even more so on Tuesday continuing into Wednesday. Lake conditions will likely change abruptly each afternoon as the afternoon zephyr kicks in. Prepare for choppy lakes if planning to be on the water.

Also, keep in mind, lake temperatures are much colder than the air temperature. With Lake Tahoe at nearly 62 degrees, hypothermia could begin to occur in less than 30 minutes for adults and even more quickly for children. At these temperatures, the threat of cold shock is present as well. Sudden immersion into colder lakes could cause incapacitation; alcohol intensifies these effects. It is strongly recommended that everyone wear a personal flotation device if out on area lakes.

Otherwise, temperatures will slowly trend lower each day as troughing brings marginally cooler flow over the region. Expect temperatures to be around seasonal averages in the mid/upper 80s to around 90 degrees for western nevada and 10 degrees cooler for Sierra valleys through mid week. Boyd

Long term...Thursday through Sunday...

Models continue to trend a deeper trough moving into the Pacific

Northwest Friday through Sunday. This will mean that winds will increase going into the weekend, along with cooling temperatures back down to below average. There are still some differences and uncertainties in the forecast regarding wind speeds and cooling, but indications are definitely showing a better potential for gusty winds next weekend that would lead to choppy lake conditions and potentially critical fire weather. Hoon

Aviation...

Winds wills will continue to increase over the next couple days with SW-W gusts around 25-30kts, especially Tuesday afternoon and evening. Smoke and haze from the Trailhead Fire west of Tahoe will also filter into the area, although no restrictions to visibility are expected. Hoon

FIRE WEATHER...

* Fire Weather Watch Tuesday for much of western Nevada
* Breezy and dry week ahead, especially along the Sierra Front
* Cooler and windy possible for next weekend

Main concern for the week is a few days of breezy afternoon winds and potential for critical conditions for the Sierra Front on Tuesday. Although temperatures will be cooler (close to normal for early July), the minimum humidity will be near and below 15% most of the week.

Monday to Wednesday, low pressure will move into the Pacific Northwest with a trough digging along the west coast. Peak gusts today should reach near 30 mph along the Sierra Front, with a few locations seeing localized critical conditions. By Tuesday wind gusts will increase even more, reaching and as high as 35 mph and leading to a higher potential for critical fire weather conditions. Simulations push the trough overhead on Wednesday with continued breezy winds, but a tad lighter than Tuesday.

A stronger and colder low is forecast to approach the Pacific Northwest coast Friday through Sunday, which may lead to another period of stronger winds and critical fire weather conditions. Brong/Hoon

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.REV Watches/Warnings/Advisories...
NV...Red Flag Warning from 2 PM to 9 PM PDT Tuesday NVZ450-453.

CA...None.
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053
FXUS65 KREV 042035
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
135 PM PDT MON JUL 4 2016

.SYNOPSIS...

Dry and breezy conditions will prevail for the upcoming week. Smoke
and haze from the Trailhead fire will move across much of the region
each afternoon and evening through the week. A slow cooling trend
continues with daytime temperatures near average starting Tuesday.

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.SHORT TERM...

Evolution of the forecast model guidance has changed very little
today and thus the forecast reasoning has changed little with the
models in good agreement.

Biggest impact this coming week will be an increase in winds
Tuesday before dropping slightly Wednesday and Thursday. This
increase in wind speeds is in response to an incoming long wave
trough of low pressure pushing across the Pac NW with the far
southern extent affecting our area. The gusty winds will prompt
the issuance of Lake Wind Advisories for areas north of Highway 50
for Tuesday. Additional Lake Wind Advisories could be needed for
Wednesday. The gusty winds will continue to draw smoke and haze
from the Trailhead Fire east and northeast into the forecast area.
The amount of smoke and the coverage extent will be hard to
determine far in advance as it is dependent on how active the
fire becomes.

Another direct impact will be lowering temperatures through the
week. Both highs and lows will be near average for early July
through the short term part of the forecast.

Lastly...humidity levels will be quite low this week. The trough
of low pressure is very moisture starved this far south so there
may be little in the way of clouds with no chance for
precipitation through Thursday.

This combination of gusty winds and low humidity will set the
stage for critical fire weather conditions Tuesday. More on that
in the Fire Weather section below. 20

.LONG TERM...Friday through Monday...

The main weather concern for the weekend and early next week is dry
humidities and gusty winds could create periods of critical fire
weather conditions.

Low pressure systems will continue to follow a track from the
British Columbia coast into the northwest U.S. this weekend and
early next week. Latest computer simulations continue to show each
successive jet shifting a little further south bringing increased
potential for cooling and stronger winds across the east Sierra into
the Great Basin. Forecast confidence has increased to medium for a
cold front Friday night with stronger wind gusts and possible
critical fire conditions Saturday. JCM

&&

.AVIATION...

Wind speeds will stay breezy through this evening with SW-W gusts
generally 25 to 30 kts. Gusts will be a bit stronger Tuesday
afternoon and evening increasing into the 25 to 35 kt range. Smoke
and haze from the Trailhead Fire west of Tahoe will also filter into
the area each afternoon, although no restrictions to visibility are
expected. JCM

&&

.FIRE WEATHER...
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Gusty afternoon/evening winds and low humidity remain the focus of
fire weather concerns through the week.

An approaching trough of low pressure will increase the low level
winds for the area north of Highway 50 Tuesday. This will combine
with afternoon humidity levels below 15% to create critical fire
weather conditions for the Sierra Front and portions of the
western Nevada Basin and Range. The Fire Weather Watch that had
been in effect for zones 450 and 453 has been upgraded to a Red
Flag Warning for Tuesday afternoon and evening.

North and west of these zones the winds will gust over 35 mph at
times...but the latest information we have indicates those areas
do not have critical fuel conditions as yet. Still...there could
be pockets of critical fire weather conditions...especially in
the lower elevations of Lassen County east of Susanville.

To the south across Mono County...southern Lyon County and Mineral
County there will likely be wind gusts in excess of 30 mph in
localized wind prone areas along Highways 395 and 95. We do not
expect widespread wind gusts in excess of 30 mph. If the upper
level jet associated with the long wave trough were to dip farther
south there would be more widespread gusts and the Red Flag
Warnings would need to be extended south. For now that seems less
likely. Just be aware that local conditions can be far worse than
average conditions over the larger geographic zone.

Winds will decrease slightly on Wednesday and Thursday. Temperatures
will lower as well...but humidity levels will remain quite low.

A stronger cold front is forecast to approach the Pac NW Friday
through Sunday. This stronger front may lead to another period of
gusty winds and critical fire weather conditions. 20

&&

.REV Watches/Warnings/Advisories...
NV...Red Flag Warning from 2 PM to 9 PM PDT Tuesday NVZ450-453.

     Lake Wind Advisory from 1 PM to 10 PM PDT Tuesday NVZ002.

     Lake Wind Advisory from 2 PM to 11 PM PDT Tuesday NVZ004.

CA...Lake Wind Advisory from 1 PM to 10 PM PDT Tuesday CAZ071.

     Lake Wind Advisory from 1 PM to 10 PM PDT Tuesday CAZ072.

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For more information from the National Weather Service visit...
http://weather.gov/reno

861
FXUS65 KREV 051009
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
309 AM PDT TUE JUL 5 2016

.SYNOPSIS...

Dry and breezy conditions will prevail for the upcoming week with fire weather concerns this afternoon. Smoke and haze from the Trailhead fire will move across much of the region each afternoon and evening through the week. A slow cooling trend continues with daytime temperatures near average starting today.

&&

.SHORT TERM...

Forecast conditions remain relatively unchanged through the latest cycle of model simulations. Today will be the breeziest day with widespread gusts around 35 mph and up to 40 mph along the Sierra Front as a passing trough strengthens the pressure gradient across the region. Lake Wind Advisories and Red Flag Warnings are in effect for this afternoon. Please see the fire weather discussion below for more details on critical fire weather conditions.

Westerly flow will continue to promote afternoon haze and smoke from the Trailhead Fire into the Eastern Sierra and Western Nevada. How much will depend on how active the fire is today; there have been some large gains in containment. However, winds will promote more vigorous fire activity, so some smoke can still be expected.

Temperatures will start around to slightly above seasonal averages today and will slowly decrease each day as ridging retreats southward. This will open the Pacific Northwest up to an increase in storm traffic by the end of the week. The local result in the short term will be slightly cooler than seasonal temperatures Wednesday and Thursday afternoons. A frontal boundary will begin to approach the Oregon border late Sunday night, but no impacts are expected until Friday. Boyd

.LONG TERM...Friday through Tuesday...

Some minor adjustments were made in the long term forecast. Slight chances of a shower were added for Friday afternoon as the tail end of a frontal boundary drops into Modoc and Northern Washoe Counties. Although low chances of precipitation are now expected toward the Oregon border Friday, winds and low humidities will be the greater concern for much of Western Nevada. Current gusts are forecast 30-40 mph Friday and Saturday. Coupled with low RH, Friday and Saturday could be critical for fire weather.

Otherwise, temperatures are forecast to keep dropping to the low 80s by Monday for Western Nevada and lower 70s in the Sierra as upper level flow remains in a longwave trough. Boyd

&&

.Aviation...

Winds will increase again this afternoon with gusts up to 25-35kt this afternoon and evening. Light to moderate turbulence possible in the lee of the Sierra due to the stronger winds this afternoon and evening. Some light haze from the Trailhead Fire is still possible, although less than previous days and not expected to significantly reduce visibility. Hoon

&&

.FIRE WEATHER...

* Red Flag Warning is in effect today for much of western Nevada
* Cooler and windy conditions possible Friday and Saturday

Gusty afternoon/evening winds and low humidity remain the focus of fire weather concerns through the week. For today, gusty winds up to

35-40 mph and dry conditions with humidity less than 15% will
combine for critical fire weather conditions for Fire Weather Zones
450 and 453.

Wind gusts over 35 mph are also expected for the lower elevations of
Northeast CA, but fuels have not reached critical levels quiet yet.
Still, there could be some potential for localized areas of critical
conditions in the lower elevations of Lassen County east of Highway
395.

Breezy and dry conditions are also expected south into Mono/Alpine
Counties and Southern Lyon and Mineral Counties, although widespread
critical conditions are not expected at this time. No Red Flag will
be issued for zones 273 and 459, although a few localized areas may
see critical conditions briefly late this afternoon.

Winds will decrease slightly on Wednesday and Thursday, although
still breezy at times in the afternoon hours. A stronger cold front
will move through the region late Friday into the weekend, bringing
below normal temperatures, dry, gusty winds and potentially critical
fire weather conditions. Hoon

&&

.REV Watches/Warnings/Advisories...
NV...Red Flag Warning from 2 PM this afternoon to 9 PM PDT this
evening NVZ450-453.

Lake Wind Advisory from 1 PM this afternoon to 10 PM PDT this
evening NVZ002.

Lake Wind Advisory from 2 PM this afternoon to 11 PM PDT this
evening NVZ004.

CA...Lake Wind Advisory from 1 PM this afternoon to 10 PM PDT this
evening CAZ071.

Lake Wind Advisory from 1 PM this afternoon to 10 PM PDT this
evening CAZ072.

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For more information from the National Weather Service visit...
http://weather.gov/reno

642
FXUS65 KREV 052124
AFDREV

Area Forecast Discussion
National Weather Service Reno NV
224 PM PDT TUE JUL 5 2016

.SYNOPSIS...

Dry and breezy conditions will prevail for the upcoming week with fire weather concerns into this evening and again by the end of the week. Windy conditions return by Friday and a cooling trend continues with daytime temperatures dropping below average this weekend.

&&

.SHORT TERM...

Very little change to the short term forecast reasoning again today. A trough of low pressure to our north will maintain gusty winds into this evening before subsiding overnight. We will continue the Red Flag Warnings and Lake Wind Advisories into this evening. See the Fire Weather section below for more on this evening's conditions and the possibility of critical conditions later in the week.

The passage of the trough late tonight will allow winds to decrease for Wednesday and most of Thursday. Temperatures will drop a few degrees Wednesday to just below average then rebound slightly Thursday as a very weak low amplitude short wave ridge traverses the region.

By late Thursday into early Friday a much stronger trough of low pressure aloft and its associated surface cold front will begin to approach the northern CA coast. Previous forecast guidance was a little faster with this feature than current models. Its approach will signal a dramatic change in the overall weather. By late Friday afternoon winds aloft will begin to increase with a substantial jet moving into far northern CA. This will drive the cold front to just west of our forecast area and produce an increase in both the thermal and pressure gradients. Gusty winds are likely by Friday afternoon from Highway 50 north with some gusts approaching 40 mph. These gusts may continue through Friday night. This will mean higher overnight lows for all but the coldest valleys Saturday morning. Blowing dust over and downwind of the dry lake beds is a possibility by late Friday along with Lake Wind Advisories for Tahoe/Pyramid and the lakes of northeast CA. 20

.LONG TERM...Saturday through Tuesday...

Significantly cooler temperatures are in store for the weekend as large scale trough drops all the way into northern California and Nevada. It is somewhat unusual to get this deep of a trough in July and the combination of much cooler temperatures (10-15 degrees below normal) and strong winds may catch people off guard especially in the mountains.

Another concern will be the potential for critical fire weather as strong winds gusting 30-40 mph or more combine with dry air ahead of trough. It won't be extremely dry but the winds will be much stronger then our usual afternoon breezes. There is also a slight chance of precipitation near the Oregon border as the system moves through with the best chances looking to be Saturday night. -Zach

&&

.AVIATION...

WSW winds gusting up to 35 kts expected this afternoon with light to moderate turbulence in the lee of the Sierra. Less haze from the Trailhead fire is evident today but will remain possible depending on fire activity with increasing winds today. -Zach

&&

.FIRE WEATHER...

Overall winds look a bit lighter for this evening...but still
enough for critical conditions along the Sierra Front and into the
western Nevada Basin and Range. We will maintain the Red Flag
Warnings into the evening.

Winds decrease a bit Wednesday and Thursday with gusts up to 25
mph possible for most valleys and mid slopes. Humidity will
remain low through Thursday.

A much stronger area of low pressure will begin to approach the
forecast area by late Thursday night into Friday morning. Winds
ahead of the low pressure will increase Friday afternoon with
humidity fairly low for western Nevada. This low pressure will
drop temperatures by late Friday so relative humidity will be
higher for northeast CA and far northwest NV. The current
thinking is wind gusts north of Highway 50 could reach 40-45 mph
or more by late Friday with 30-35 mph south of Highway 50.

These winds...along with lower humidity along the Sierra Front
into the Basin and Range would create critical conditions. Where
fuels have cured across northwest NV and northeast CA the
stronger wind gusts may produce localized critical conditions even
if humidity values are a little high. From Mono/Alpine counties
east into southern Lyon and Mineral counties the winds gusts will
be a little less...but could still become critical by early
evening.

The strongest winds may actually be Saturday over much of the
forecast area...but temperatures lower and relative humidity
starts to climb as we get into the core of the upper level trough.
Even with slightly higher humidity overall...the wind gusts alone
could create critical conditions in parts of western Nevada south
into Mono/Alpine counties and Mineral and southern Lyon counties.

This is a fluid situation. Timing of the worst conditions could
change as we get closer to the weekend so following the most
recent weather updates will become critical. 20

&&

.REV Watches/Warnings/Advisories...
NV...Red Flag Warning until 9 PM PDT this evening NVZ450-453.

     Lake Wind Advisory until 10 PM PDT this evening NVZ002.

     Lake Wind Advisory until 11 PM PDT this evening NVZ004.

CA...Lake Wind Advisory until 10 PM PDT this evening CAZ071.

     Lake Wind Advisory until 10 PM PDT this evening CAZ072.

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For more information from the National Weather Service visit...
http://weather.gov/reno

875
FXUS65 KREV 060344 AAA
AFDREV

Area Forecast Discussion...UPDATED
National Weather Service Reno NV
844 PM PDT TUE JUL 5 2016

.UPDATE...

The upper jet associated with incoming trough was beginning to drop into the northern Great Basin, a slight delay in timing. Winds were finally coming up on the ridges with gusts around 40 mph. The lack of momentum coupled with marginal thermal gradients between the Tahoe Basin and the sinks in western NV resulted in less wind for surface locations where gusts were mostly 25-30 mph. Current winds will likley stay up this evening but remain below red flag and lake wind criteria. So we will allow the red flag warning to expire at 9pm and will be canceling the lake wind advisories early with this update. Hohmann

&&

.SYNOPSIS...

Seasonal temperatures will prevail through Thursday with typical afternoon and evening breezes. A strong low pressure system for July will push into the Pacific Northwest Friday and this weekend for increasing wind and cooler temperatures.

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.PREVIOUS DISCUSSION... /Issued 224 PM PDT TUE JUL 5 2016/

SYNOPSIS...

Dry and breezy conditions will prevail for the upcoming week with fire weather concerns into this evening and again by the end of the week. Windy conditions return by Friday and a cooling trend continues with daytime temperatures dropping below average this weekend.

SHORT TERM...

Very little change to the short term forecast reasoning again today. A trough of low pressure to our north will maintain gusty winds into this evening before subsiding overnight. We will continue the Red Flag Warnings and Lake Wind Advisories into this evening. See the Fire Weather section below for more on this evening's conditions and the possibility of critical conditions later in the week.

The passage of the trough late tonight will allow winds to decrease for Wednesday and most of Thursday. Temperatures will drop a few degrees Wednesday to just below average then rebound slightly Thursday as a very weak low amplitude short wave ridge traverses the region.

By late Thursday into early Friday a much stronger trough of low pressure aloft and its associated surface cold front will begin to approach the northern CA coast. Previous forecast guidance was a little faster with this feature than current models. Its approach will signal a dramatic change in the overall weather. By late Friday afternoon winds aloft will begin to increase with a substantial jet moving into far northern CA. This will drive the cold front to just west of our forecast area and produce an increase in both the thermal and pressure gradients. Gusty winds are likely by Friday afternoon from Highway 50 north with some gusts approaching 40 mph. These gusts may continue through Friday night. This will mean higher overnight lows for all but the coldest valleys Saturday morning. Blowing dust over and downwind of the dry lake beds is a possibility by late Friday along with Lake Wind Advisories for Tahoe/Pyramid and the lakes of northeast CA. 20

LONG TERM...Saturday through Tuesday...

Significantly cooler temperatures are in store for the weekend as large scale trough drops all the way into northern California and

Nevada. It is somewhat unusual to get this deep of a trough in July and the combination of much cooler temperatures (10-15 degrees below normal) and strong winds may catch people off guard especially in the mountains.

Another concern will be the potential for critical fire weather as strong winds gusting 30-40 mph or more combine with dry air ahead of trough. It won't be extremely dry but the winds will be much stronger then our usual afternoon breezes. There is also a slight chance of precipitation near the Oregon border as the system moves through with the best chances looking to be Saturday night. -Zach

AVIATION...

WSW winds gusting up to 35 kts expected this afternoon with light to moderate turbulence in the lee of the Sierra. Less haze from the Trailhead fire is evident today but will remain possible depending on fire activity with increasing winds today. -Zach

FIRE WEATHER...

Overall winds look a bit lighter for this evening...but still enough for critical conditions along the Sierra Front and into the western Nevada Basin and Range. We will maintain the Red Flag Warnings into the evening.

Winds decrease a bit Wednesday and Thursday with gusts up to 25 mph possible for most valleys and mid slopes. Humidity will remain low through Thursday.

A much stronger area of low pressure will begin to approach the forecast area by late Thursday night into Friday morning. Winds ahead of the low pressure will increase Friday afternoon with humidity fairly low for western Nevada. This low pressure will drop temperatures by late Friday so relative humidity will be higher for northeast CA and far northwest NV. The current thinking is wind gusts north of Highway 50 could reach 40-45 mph or more by late Friday with 30-35 mph south of Highway 50.

These winds...along with lower humidity along the Sierra Front into the Basin and Range would create critical conditions. Where fuels have cured across northwest NV and northeast CA the stronger wind gusts may produce localized critical conditions even if humidity values are a little high. From Mono/Alpine counties east into southern Lyon and Mineral counties the winds gusts will be a little less...but could still become critical by early evening.

The strongest winds may actually be Saturday over much of the forecast area...but temperatures lower and relative humidity starts to climb as we get into the core of the upper level trough. Even with slightly higher humidity overall...the wind gusts alone could create critical conditions in parts of western Nevada south into Mono/Alpine counties and Mineral and southern Lyon counties.

This is a fluid situation. Timing of the worst conditions could change as we get closer to the weekend so following the most recent weather updates will become critical. 20

&&

.REV Watches/Warnings/Advisories...
NV...None.
CA...None.

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For more information from the National Weather Service visit...
http://weather.gov/reno

APPENDIX H

SMOKE TEXT PRODUCTS

Monday, June 28 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1745Z June 28, 2016

```
SMOKE:
South Central Canada to the Southern Plains States:
A large area of thin remnant smoke extended from portions of northern
Manitoba west towards central Alberta and then south through Central and
Southern Plains.  Within this, an area of moderate density smoke was
seen over southeastern Colorado and was likely from the fire activity
over north central Colorado.  Further north, an area of moderate density
smoke was seen over portions of central Manitoba and southern Alberta.
This is likely from recent fire activity over northern Alberta, northern
Saskatchewan and the Northwest Territories.

Alaska:
An area of remnant smoke extended from eastern Alaska through portions
of central Alaska and was likely from recent fire activity over central
Alaska.

Hanna
THIS TEXT PRODUCT IS PRIMARILY INTENDED TO DESCRIBE SIGNIFICANT AREAS
OF SMOKE ASSOCIATED WITH ACTIVE FIRES AND SMOKE WHICH HAS BECOME
DETACHED FROM THE FIRES AND DRIFTED SOME DISTANCE AWAY FROM THE SOURCE
FIRE. TYPICALLY OVER THE COURSE OF ONE OR MORE DAYS. AREAS OF BLOWING DUST
ARE ALSO DESCRIBED. USERS ARE ENCOURAGED TO VIEW A GRAPHIC DEPICTION OF
THESE AND OTHER PLUMES WHICH ARE LESS EXTENSIVE AND STILL ATTACHED TO
THE SOURCE FIRE IN VARIOUS GRAPHIC FORMATS ON OUR WEB SITE:

JPEG:   http://www.ospo.noaa.gov/Products/land/hms.html
GIS:    http://www.firedetect.noaa.gov/viewer.htm
KML:    http://www.ssd.noaa.gov/PS/FIRE/kml.html
ANY QUESTIONS OR COMMENTS REGARDING THIS PRODUCT SHOULD BE SENT TO
SSDFireTeam@noaa.gov
```

Unless otherwise indicated:

- Areas of smoke are analyzed using GOES-EAST and GOES-WEST Visible satellite imagery.
- Only a general description of areas of smoke or significant smoke plumes will be analyzed.
- A quantitative assessment of the density/amount of particulate or the vertical distribution is not included.
- Widespread cloudiness may prevent the detection of smoke even from significant fires.

Monday, June 28 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0300Z June 29, 2016

SMOKE:
Northwestern Canada:
Moderately dense to locally thick smoke could be seen emanating from firs in the central portion of the Yukon in northwestern Canada as well as the western and southern parts of the Northwest Territories and northern Saskatchewan.

Alaska:
Fires were still evident in west central Alaska through the afternoon though only a little information could be obtained on the extent of the smoke in satellite imagery due to cloudiness in the region.

California:
A thin density aerosol was visible across a portion of southern and central California which may be remnant smoke from the Erskine Fire in southern California though it is not certain due to interference from cloudiness in the region.

See section below for a description of aerosol/smoke which as visible from South Central Canada to the Southern Plains of the US earlier this morning. Cloudiness developed across portions of this region today which limited additional information on the smoke from satellite imagery.

DUST:
Caribbean/Bay of Campeche:
An aerosol which is believed to be Saharan dust was present stretching from the Caribbean westward over the Yucatan Peninsula to the Bay of Campeche.

JS

Earlier This Morning...
SMOKE:
South Central Canada to the Southern Plains States:
A large area of thin remnant smoke extended from portions of northern Manitoba west towards central Alberta and then south through Central and Southern Plains. Within this, an area of moderate density smoke was seen over southeastern Colorado and was likely from the fire activity over north central Colorado. Further north, an area of moderate density smoke was seen over portions of central Manitoba and southern Alberta. This is likely from recent fire activity over northern Alberta, northern Saskatchewan and the Northwest Territories.

Alaska:
An area of remnant smoke extended from eastern Alaska through portions of central Alaska and was likely from recent fire activity over central Alaska.

Hanna

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Monday, June 28 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0300Z June 29, 2016

SMOKE:
Northwestern Canada:
Moderately dense to locally thick smoke could be seen emanating from firs in the central portion of the Yukon in northwestern Canada as well as the western and southern parts of the Northwest Territories and northern Saskatchewan.

Alaska:
Fires were still evident in west central Alaska through the afternoon though only a little information could be obtained on the extent of the smoke in satellite imagery due to cloudiness in the region.

California:
A thin density aerosol was visible across a portion of southern and central California which may be remnant smoke from the Erskine Fire in southern California though it is not certain due to interference from cloudiness in the region.

See section below for a description of aerosol/smoke which as visible from South Central Canada to the Southern Plains of the US earlier this morning. Cloudiness developed across portions of this region today which limited additional information on the smoke from satellite imagery.

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Caribbean/Bay of Campeche:
An aerosol which is believed to be Saharan dust was present stretching from the Caribbean westward over the Yucatan Peninsula to the Bay of Campeche.

JS

Earlier This Morning...
SMOKE:
South Central Canada to the Southern Plains States:
A large area of thin remnant smoke extended from portions of northern Manitoba west towards central Alberta and then south through Central and Southern Plains. Within this, an area of moderate density smoke was seen over southeastern Colorado and was likely from the fire activity over north central Colorado. Further north, an area of moderate density smoke was seen over portions of central Manitoba and southern Alberta. This is likely from recent fire activity over northern Alberta, northern Saskatchewan and the Northwest Territories.

Alaska:
An area of remnant smoke extended from eastern Alaska through portions of central Alaska and was likely from recent fire activity over central Alaska.

Hanna

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- Widespread cloudiness may prevent the detection of smoke even from significant fires.

Wednesday, June 29 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1700Z June 29, 2016

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SMOKE:
Southern Plains to New Mexico:
An area of remnant smoke, which is likely from fire activity over portions
of north central Colorado, extended from portions of New Mexico northeast
through the Southern Plains.

Northern Plains to Northwestern Canada:
An area of remnant smoke extended  from the Northern Plains north
through much of south central Canada towards the Northwest Territories.
This large area of remnant smoke was likely from fire activity over
portions of western South Dakota and also from recent fires over the
Northwest Territories.

Hanna

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OF SMOKE ASSOCIATED WITH ACTIVE FIRES AND SMOKE WHICH HAS BECOME
DETACHED FROM THE FIRES AND DRIFTED SOME DISTANCE AWAY FROM THE SOURCE
FIRE. TYPICALLY OVER THE COURSE OF ONE OR MORE DAYS. AREAS OF BLOWING DUST
ARE ALSO DESCRIBED. USERS ARE ENCOURAGED TO VIEW A GRAPHIC DEPICTION OF
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Wednesday, June 29 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 0245Z June 30, 2016

SMOKE:
Northwestern Canada to the Northern Plains
The southeastern part of the large swath of remnant thin density
smoke attributed to fires in northwestern Canada shifted farther to
the south across south central Canada and into the northern portions
of Montana, North Dakota, and Minnesota. The northwestern part of
this huge region of smoke extended to the northwest and well up into
northwestern Canada. Closer to the active fires in northwestern Canada,
patches of moderately dense to thick smoke were visible over portions
of the Yukon, the Northwest Territories, far northeastern Alberta,
and northern Saskatchewan.

Kansas/Oklahoma:
A cluster of seasonal fires from west central Oklahoma to central Kansas
resulted in a number of smoke plumes which congealed into a north-south
elongated area of thin density smoke in this region.

Alaska:
Some fire activity was detected in satellite imagery, but only some
smoke was visible due to significant cloud cover.

DUST:
Caribbean/Yucatan/Bay of Campeche:
The area of Saharan dust moved a bit farther to the west and was present
over the western Caribbean, the Yucatan peninsula, the Bay of Campeche,
and into the mainland of southeastern Mexico.

JS

Earlier This Morning...
SMOKE:
Southern Plains to New Mexico:
An area of remnant smoke, which is likely from fire activity over portions
of north central Colorado, extended from portions of New Mexico northeast
through the Southern Plains.

Hanna

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- Widespread cloudiness may prevent the detection of smoke even from significant fires.

Thursday, June 30 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1745Z June 30, 2016

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SMOKE:
Northwestern Canada to the Northern Plains
The southeastern part of the large swath of remnant thin density smoke
attributed to fires in northwestern Canada shifted farther to the south
across south central Canada and into portions of northern Michigan,
northern Wisconsin, central Minnesota, North Dakota, South Dakota and
eastern Montana. The northwestern part of this huge region of smoke
extended to the northwest and well up into northwestern Canada. Some
moderate to locally very dense smoke was located over portions of northern
Saskatchewan and the southern Northwest Territories.

Hanna

THIS TEXT PRODUCT IS PRIMARILY INTENDED TO DESCRIBE SIGNIFICANT AREAS
OF SMOKE ASSOCIATED WITH ACTIVE FIRES AND SMOKE WHICH HAS BECOME
DETACHED FROM THE FIRES AND DRIFTED SOME DISTANCE AWAY FROM THE SOURCE
FIRE. TYPICALLY OVER THE COURSE OF ONE OR MORE DAYS. AREAS OF BLOWING DUST
ARE ALSO DESCRIBED. USERS ARE ENCOURAGED TO VIEW A GRAPHIC DEPICTION OF
THESE AND OTHER PLUMES WHICH ARE LESS EXTENSIVE AND STILL ATTACHED TO
THE SOURCE FIRE IN VARIOUS GRAPHIC FORMATS ON OUR WEB SITE:

JPEG:   http://www.ospo.noaa.gov/Products/land/hms.html
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KML:    http://www.ssd.noaa.gov/PS/FIRE/kml.html
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- A quantitative assessment of the density/amount of particulate or the vertical distribution is not included.
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Thursday, June 30 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0300Z July 1, 2016

SMOKE:
Northwestern Canada to the Central US:
A huge area of thin density smoke attributed mainly to the wildfires burning over portions of Canada's Yukon, Northwest Territories, northern Alberta, and northern Saskatchewan was analyzed stretching from northwestern Canada to the southeast over south central Canada and over the north central US from Montana across a portion of the Northern and Central Plains. Closer to the fire activity, an expanding mass of moderately dense to thick smoke extended primarily from northern Saskatchewan and northern Alberta northward over the Northwest Territories.

Kansas/Oklahoma:
Seasonal fires over central and south central Kansas as well as north central to west central Oklahoma resulted in patches of thin density smoke in this region.

Alaska:
Similar to yesterday, a few fires were detected in west central and central Alaska though limited information on the smoke extent and density could be determined from satellite imagery due to cloudiness.

DUST:
Bay of Campeche:
The long lived area of Saharan dust was now over the Bay of Campeche spreading west into mainland southeastern Mexico.

JS

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Friday, July 01 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1700Z July 1, 2016

SMOKE:
Northwestern and Central Canada/Upper Mississippi Valley:
A huge area of thin density smoke attributed mainly to the
wildfires burning over portions of central Canada can be seen
stretching across southeast Northwest Territory into Nunavut,
south across northeast/northern Alberta, into northern and central
Saskatchewan/Manitoba. The heaviest smoke is seen across portions of
northeast Alberta, northwest Saskatchewan and south central Northwest
Territory.
Across the US, a small area of light density residual smoke stretches
southeast from central Minnesota into western Wisconsin.

Alaska:
Wildfires in west central and central Alaska have produced an area
of light residual smoke stretching from northeast Alaska and across
northern sections of Yukon and Northwest Territories. Near the source
these wildfires are producing light to moderately dense smoke.

J Kibler

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Friday, July 01 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0200Z July 2, 2016

SMOKE:
California:
Several wildfires were seen emitting smoke in California including the wildfire named Pine in Ventura county, the Erskine fire in the southern portion of the Sierra Nevada mountains and Trailhead in El Dorado county California. The Pine fire in southern California was producing a light to moderate density smoke plume which spread to the north. The Erskine fire was producing a light to moderate density smoke plume to the east. Finally the Trailhead fire in the Sierra foothills was emitting a light to heavy density smoke plume to the northeast.

Northwestern and Central Canada:
A huge area of thin density remnant smoke attributed mainly to wildfires burning over portions of central Canada can be seen stretching across southeast Northwest Territory into Nunavut, south across northeast/northern Alberta, into northern and central Saskatchewan/Manitoba. The heaviest remnant smoke is seen across portions of northeast Alberta, northwest Saskatchewan and south central Northwest Territory. A myriad of light to heavy density smoke plumes associated with wildfires in northern Saskatchewan, northeast Alberta and southeast of Great Slave lake in the Northwest Territories were primarily traveling the north.

DUST:
Gulf of Mexico/Texas
An area of Saharan dust was seen entering into southern Texas from the Gulf of Mexico and could be seen throughout of the southern and western portions of the Gulf of Mexico.

-Cronin

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Friday, July 02 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1615Z July 2, 2016

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SMOKE:
Southern Canada to Northwestern Canada and Alaska:
A large area of remnant smoke from fires over the Northwest Territories,
northern Saskatchewan and northern Alberta extends from portions of
southern Ontario northern Michigan and extends northwest to portions of
northwest Canada and eastern Alaska.  An area of moderate density smoke
was seen over the Northwest Territories.

Texas:
A thin area of remnant smoke was over portions of east Texas.  The source
of this is believed to be scattered fire activity within the area over
the past few days.

Hanna

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Saturday, July 02 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0200Z July 3, 2016

SMOKE:
Southern Canada to Northwestern Canada and Alaska:
A large area of light remnant smoke from fires over the Northwest Territories, northern Saskatchewan and northern Alberta extends from portions of southern Ontario northern Michigan and extends northwest to portions of northwest Canada and eastern Alaska. An area of moderate density smoke was seen over the Northwest Territories. Multiple light to heavy density smoke plumes were seen moving north in northeast Alberta, northern Saskatchewan and southeast of Great Slave Lake in the Northwest Territories. Another group of wildfires in northeast Manitoba were seen emitting light to moderate density smoke to the south.

California:
An area of light to moderate density smoke was seen fanning out to the north and west from the wildfire named Pine in Ventura county. Another wildfire in the Sierra foothills named Trailhead was emitting a light to heavy density smoke plume to the northeast.

DUST:
Gulf of Mexico/Texas/Lower Mississippi River Valley/Southeast US:
An area of Saharan dust was seen spanning from the western portions of the Gulf of Mexico north into eastern Texas, and eastern Oklahoma. This area of dust possibly mixed with remnant smoke and sulfates in the Lower Mississippi River Valley and the Southeast US. Cloud cover obscured the extent of this aerosol to the north.

-Cronin

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Sunday, July 3, 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1730Z July 3, 2016

SMOKE:
Beaufort Sea/Northwestern to South Central Canada/Great Lakes Region:
An extensive area of light remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and north Manitoba extends southeastward from the Beaufort Sea to southern Ontario and the northern Great Lakes. Moderately dense to dense smoke is especially prevalent over the Northwest Territories directly north of the bulk of the fire activity.

Alaska:
A patch of thin remnant smoke is analyzed over northern Alaska, with nearby fires the likely cause. Off the western and southwestern coasts of the state, additional aerosol is observed that is thought to be remnant smoke from wildfires in Siberia that is now drifting east.

Western US:
Areas of thin to moderately dense smoke are seen over parts of northern California, Nevada, northwest Utah, and southeast Idaho. This smoke is largely from the Trailhead fire in California and the Hot Pot fire in northern Nevada.

DUST:
Gulf of Mexico/Texas Coast/Lower Mississippi River Valley/Southeast US:
An area of Saharan dust was seen over western and central portions of the Gulf of Mexico north to the Texas coast. Some of this dust possibly mixed with remnant smoke and sulfates also appears over parts of the Lower Mississippi River Valley and the Southeast US eventually disappearing beneath cloud cove just off the coast of North Carolina.

Eastern Caribbean/Bahamas/South Florida:
A large area of optically thick Saharan dust can be seen pushing westward across the Caribbean Sea from the Leeward Islands to just east of Jamaica. Other smaller separate areas of Saharan dust can also be seen crossing the Bahamas and far southern Florida/northwest Cuba

UNKNOWN AEROSOL:
New England/Canadian Maritimes:
A faint aerosol is seen along/off the coast of New England stretching from eastern Massachusetts east-northeast across the southern tip of Nova Scotia and then northeast along the coast as it wraps into a surface low over western Newfoundland. The composition and origin of this aerosol is not known.

Sheffler

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Sunday, July 3, 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0100Z July 4, 2016

SMOKE:
Northwestern to South Central Canada/Great Lakes Region:
An extensive area of light density remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and northern Manitoba extends southeastward from northwest Nunavut to southern Ontario and the northern Great Lakes. Moderately dense to dense smoke is especially prevalent over the Northwest Territories directly north of the bulk of the fire activity. Numerous wildfires were seen in between cloud cover emitting light to heavy density smoke to the north in northern Saskatchewan and southeast of Great Slave Lake in the Northwest Territories. Wildfires in northern Manitoba were producing light to moderate density smoke to the west.

California/Nevada:
Areas of thin to moderately dense remnant smoke were seen over parts of northern and southern California, and Nevada. This smoke is largely from the Trailhead fire in California, the fire named Pine in Ventura County California and the Hot Pot fire in northern Nevada. The Pine fire was fanning light to moderate density to the southwest and northwest while the Trailhead fire in the Sierra foothills continues to emit a light to moderate density smoke plume to the northeast into western Nevada. The Hot Pot brush fire in west-central Elko county Nevada was seen spreading quickly to the east-northeast in shortwave IR imagery. A light to heavy density smoke plume was emanating to the east-northeast from this brush fire although clouds obscured the full extent of this smoke to the east.

DUST:
Eastern Caribbean/Bahamas/South Florida:
A large area of optically thick Saharan dust can be seen pushing westward across the Caribbean Sea from the Leeward Islands to just east of Jamaica. Other smaller separate areas of Saharan dust can also be seen crossing the Bahamas and far southern Florida/northwest Cuba although clouds began to obscure the extent of this dust in the afternoon and evening.

-Cronin

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Saturday, July 4, 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1815Z July 4, 2016

SMOKE:
Northwestern to South Central Canada:
An extensive area of light density remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and northern Manitoba extends southeastward from northwest Nunavut to southeast Ontario/southwest Quebec. Moderately dense to dense smoke is especially prevalent over the Northwest Territories directly north of the bulk of the fire activity.

North Utah/Northwest Colorado/South Wyoming:
An area of moderately dense to dense smoke has moved from northern Utah eastward today crossing southern Wyoming and northwest Colorado. This remnant smoke is primarily from the Hot Pot brush fire in west-central Elko county Nevada. However, two smoke producing fires in the Sierra Nevada yesterday may have also contributed to this area of smoke.

North Dakota/Northwest Minnesota/Southern Manitoba:
An area of thin remnant smoke observed over eastern North Dakota, northwest Minnesota, and southern Manitoba is likely from the brush fire in Nevada.

Alaska:
Remnant smoke is seen from the northern coast of the Alaska stretching northeast across the Arctic waters and ice. In addition a small patch of thin smoke is observed off the west coast of Alaska between areas of cloud cover. All of this smoke is primarily believed to be from Siberian wildfires.

DUST:
Eastern Caribbean/Bahamas/South Florida/Southeast Gulf of Mexico/Western Atlantic:
An expansive area of optically thick Saharan dust can be seen pushing westward across almost the entire Caribbean Sea from the Leeward Islands to just east of the Yucatan Peninsula. The dust extends north across Hispanola and eastern Cuba over much of the Bahamas and into part of the western Atlantic. Saharan dust can also be seen spreading west across southern Florida and the southeastern Gulf of Mexico.

Western and Northern Gulf of Mexico/Southern Plains/Lower Mississippi River Valley/Southeast US:
A broad area of aerosol that is believed to be mostly African dust is present across the western and northern portions of the Gulf of Mexico extending inland across central Texas/far southern Oklahoma, the Lower Mississippi River Valley, and much of the Southeast US disappearing beneath cloud cover over North Carolina. Other aerosols including a small amount of remnant smoke may be mixed with the elevated dust. Remnant smoke coming from Mexican oil rigs in the Bay of Campeche could be seen over the western Gulf as well.

Central Nunavut:
A swath of aerosol thought to be elevated dust is seen moving west along the northwestern shore of Hudson Bay becoming mixed with the extensive area of remnant smoke over northwest Canada. The origin of the dust is not known.

UNKNOWN AEROSOL:
Northeast US/Canadian Maritimes:
A faint aerosol is seen moving off the coast of the Northeastern US states

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and across Nova Scotia, Newfoundland, and the Gulf of St. Lawrence. While
the composition of the aerosol can not be fully determined, it seems
plausible that this could be remnant smoke from the wildfires in Canada,
possibly mixed with other unknown aerosols.

Great Lakes Region:
An area of aerosol is observed moving northward across far northeast Iowa,
southeast Minnesota, Wisconsin, Lake Michigan, Michigan, and Lake Superior
towards southern Ontario. There is a possibility that this aerosol is
dust although it is uncertain if this is the case given the wide array
of aerosols and sources across the United States today.

Sheffler

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Sunday, July 4, 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0200Z July 5, 2016

SMOKE:
Northwestern to South Central Canada:
An extensive area of light density remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and northern Manitoba extends southeastward from northwest Nunavut to southeast Ontario/southwest Quebec. Moderately dense to dense smoke is especially prevalent over the Northwest Territories directly north of the bulk of the fire activity. Numerous wildfires were seen in between cloud cover emitting light to heavy density smoke to the west-northwest in northern Saskatchewan and southeastern portions of the Northwest Territories. Wildfires in northern Manitoba were producing light to moderate density smoke to the west and west-southwest.

Nebraska/Kansas/Northeast Colorado/Southern Wyoming:
An area of light to moderate density remnant smoke has moved from northern Utah eastward today crossing southern Wyoming, northeast Colorado into western Nebraska and north-central Kansas. This remnant smoke is primarily from the Hot Pot brush fire in west-central Elko county Nevada. However, two smoke producing fires in the Sierra Nevada yesterday may have also contributed to this area of smoke. The western extent of this area of smoke was obscured by clouds.

California:
The fire named Pine in southern California was fanning light to moderate density smoke to the southwest and north while the Trailhead fire in the Sierra foothills continues to emit a light to moderate density smoke plume to the northeast into western Nevada.

DUST:
Eastern Caribbean/Bahamas/South Florida/Southeast Gulf of Mexico/Western Atlantic:
An expansive area of optically thick Saharan dust can be seen pushing westward across almost the entire Caribbean Sea from the Leeward Islands to the Yucatan Peninsula. The dust extends north across Hispanola and eastern Cuba over much of the Bahamas and into part of the western Atlantic.

Western and Northern Gulf of Mexico/Southern Plains/Lower Mississippi River Valley/Southeast US:
A broad area of aerosol that is believed to be mostly diffuse Saharan dust is present across the western and northern portions of the Gulf of Mexico extending inland across central Texas/far southern Oklahoma, the Lower Mississippi River Valley, and much of the Southeast US disappearing beneath cloud cover over North Carolina. Other aerosols including a small amount of remnant smoke may be mixed with the elevated dust. Remnant smoke coming from Mexican oil rigs in the Bay of Campeche could be seen over the western Gulf as well.

Nevada:
A small area of blowing dust/sand originating from the Carson sink was seen in west-central Nevada moving east-southeast from the source region.

UNKNOWN AEROSOL:
Northeast US/Canadian Maritimes:
A faint aerosol is seen moving off the coast of the Northeastern US states and across Nova Scotia, Newfoundland, and the Gulf of St. Lawrence. While the composition of the aerosol can not be fully determined, it seems plausible that this could be remnant smoke from the wildfires in Canada,

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possibly mixed with other unknown aerosols.

-Sheffler/Cronin

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Tuesday, July 5, 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 1515Z July 5, 2016

SMOKE:
Northwestern to South Central Canada:
An extensive area of light density remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and northern Manitoba extends from the Canadian Arctic southward across Nunavut/Northwest Territories and then southeastward across northern parts of Alberta/Saskatchewan/Manitoba. Moderately dense to dense smoke is especially prevalent over northwest Alberta, north Saskatchewan, and the Northwest Territories directly north and northwest of the bulk of the fire activity. Additional moderately dense to dense smoke stretches further north across northwest Nunavut and Victoria Island. In general the entire area of smoke has shifted further west over northwestern Canada during the last 24 hours.

Southeast Canada:
A few patches of thin aerosol believed to be remnant smoke are seen over southeast Quebec, the Gulf of St. Lawrence, and over/off the coast of Newfoundland. This smoke is from the wildfires burning in western Canada.

Alaska:
Areas of thin to moderately dense remnant smoke are present over northwest Alaska and across the Beaufort Sea. Most of this smoke is from wildfires burning in Siberia.

Nebraska/South Dakota/Kansas/Missouri:
An area of light to moderate density remnant smoke could still be identified this morning over east Kansas/western Missouri that is likely from the Hot Pot brush fire in west-central Elko county Nevada. Some additional thin smoke may exist over southern South Dakota/Nebraska/northwest Kansas though scattered cloud cover and mixture of the smoke with other aerosols such as dust made proper identification difficult.

New Mexico:
A small patch of thin remnant smoke is present over eastern New Mexico. This may be from a fire further west in the state.

DUST:
Caribbean Sea/Gulf of Mexico/Bahamas/Florida/Southeast US Coast:
An expansive area of optically thick Saharan dust continues to be seen pushing westward across almost the entire Caribbean Sea from the Leeward Islands west to the Bay of Campeche/Yucatan Peninsula. Additionally lesser amounts of Saharan dust can be seen over most of the Gulf of Mexico, Florida, Cuba, the Bahamas, and along/off the coast of the Southeast US. A negligible amount of smoke observed yesterday from oil rigs in the Bay of Campeche may have drifted northwest and mixed with the elevated over the northwest Gulf of Mexico.

Southern/Central/Northern Plains States:
Elevated dust can be seen in morning GOES-W imagery stretching from Central Texas northward through the Central Plains states and ending over east Nebraska, southeast South Dakota, southern Minnesota, and Iowa. The bulk of this elevated dust is of African origin having moved west across the Atlantic and eventually wrapping northward through the western Gulf of Mexico. Some smoke is embedded within the larger area of dust over east Kansas/west Missouri mostly from the Hot Pot Fire in Nevada over the past few days.

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-Sheffler

THIS TEXT PRODUCT IS PRIMARILY INTENDED TO DESCRIBE SIGNIFICANT AREAS
OF SMOKE ASSOCIATED WITH ACTIVE FIRES AND SMOKE WHICH HAS BECOME
DETACHED FROM THE FIRES AND DRIFTED SOME DISTANCE AWAY FROM THE SOURCE
FIRE. TYPICALLY OVER THE COURSE OF ONE OR MORE DAYS. AREAS OF BLOWING DUST
ARE ALSO DESCRIBED. USERS ARE ENCOURAGED TO VIEW A GRAPHIC DEPICTION OF
THESE AND OTHER PLUMES WHICH ARE LESS EXTENSIVE AND STILL ATTACHED TO
THE SOURCE FIRE IN VARIOUS GRAPHIC FORMATS ON OUR WEB SITE:

JPEG:   http://www.ospo.noaa.gov/Products/land/hms.html
GIS:    http://www.firedetect.noaa.gov/viewer.htm
KML:    http://www.ssd.noaa.gov/PS/FIRE/kml.html
ANY QUESTIONS OR COMMENTS REGARDING THIS PRODUCT SHOULD BE SENT TO
SSDFireTeam@noaa.gov
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Unless otherwise indicated:

- Areas of smoke are analyzed using GOES-EAST and GOES-WEST Visible satellite imagery.
- Only a general description of areas of smoke or significant smoke plumes will be analyzed.
- A quantitative assessment of the density/amount of particulate or the vertical distribution is not included.
- Widespread cloudiness may prevent the detection of smoke even from significant fires.

Tuesday, July 5, 2016

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY THROUGH 0300Z July 6, 2016

SMOKE:
Northwestern Canada:
Numerous fires continued to burn over northwestern Canada especially across northern Saskatchewan and northern Alberta as well as portions of the Northwest Territories. The large mass of moderately dense to thick smoke which extended from northern Alberta and northern Saskatchewan northward to extreme northern Canada and over the Arctic continues to push slowly to the west.

Alaska:
Only a relatively small patch of thin to moderately dense smoke was visible in satellite imagery around a pair of fire complexes over west central Alaska due to interference from cloudiness.

Central US:
A remnant area of thin density smoke continued to be seen from southeastern Kansas and southern Missouri to southeastern Nebraska and southern Iowa. This leftover smoke may be from the Hot Pot brush fire in west-central Elko county Nevada which had been burning in recent days.

JS

Earlier This Morning...
SMOKE:
Northwestern to South Central Canada:
An extensive area of light density remnant smoke from fires in the Northwest Territories, northern Saskatchewan, northern Alberta, and northern Manitoba extends from the Canadian Arctic southward across Nunavut/Northwest Territories and then southeastward across northern parts of Alberta/Saskatchewan/Manitoba. Moderately dense to dense smoke is especially prevalent over northwest Alberta, north Saskatchewan, and the Northwest Territories directly north and northwest of the bulk of the fire activity. Additional moderately dense to dense smoke stretches further north across northwest Nunavut and Victoria Island. In general the entire area of smoke has shifted further west over northwestern Canada during the last 24 hours.

Southeast Canada:
A few patches of thin aerosol believed to be remnant smoke are seen over southeast Quebec, the Gulf of St. Lawrence, and over/off the coast of Newfoundland. This smoke is from the wildfires burning in western Canada.

Alaska:
Areas of thin to moderately dense remnant smoke are present over northwest Alaska and across the Beaufort Sea. Most of this smoke is from wildfires burning in Siberia.

Nebraska/South Dakota/Kansas/Missouri:
An area of light to moderate density remnant smoke could still be identified this morning over east Kansas/western Missouri that is likely from the Hot Pot brush fire in west-central Elko county Nevada. Some additional thin smoke may exist over southern South Dakota/Nebraska/northwest Kansas though scattered cloud cover and mixture of the smoke with other aerosols such as dust made proper identification difficult.

New Mexico:
A small patch of thin remnant smoke is present over eastern New

Mexico. This may be from a fire further west in the state.

DUST:
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