NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

ANALYSIS OF AUGUST 2015 WILDFIRES IN THE WESTERN UNITED STATES AS AN EXCEPTIONAL EVENT AND THEIR CONTRIBUTION TO HIGH OZONE CONCENTRATIONS IN FALLON, NEVADA

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LIST OF ACRONYMS AND ABBREVIATIONS

agl	Above ground level
amsl	Above mean sea level
AQI	Air Quality Index
AQS	Air Quality System
BAQP	Bureau of Air Quality Planning
CFR	Code of Federal Regulations
°F	Degrees Fahrenheit
EER	Exceptional Event Rule
FEM	Federal Equivalence Method
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory
km	kilometers
m	Meters
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
ND	Not determined
NDEP	Nevada Division of Environmental Protection
NO	Nitrogen Monoxide
NOAA	National Oceanic and Atmospheric Administration
NO_x	Oxides of Nitrogen
O_3	Ozone
ppb	Parts per billion
$PM_{2.5}$	Particulate Matter Smaller than 2.5 Micrometers
PST	Pacific Standard Time
tpd	Tons per day
U.S.	United States
U.S. EPA	United States Environmental Protection Agency
UTC	Coordinated Universal Time
VOCs	Volatile Organic Compounds

ANALYSIS OF WILDFIRES IN THE WESTERN UNITED AS AN EXCEPTIONAL EVENT AND THEIR CONTRIBUTIONS TO HIGH OZONE CONCENTRATIONS IN FALLON, NEVADA ON AUGUST 20 AND 21, 2015

1.0 INTRODUCTION

The Nevada Division of Environmental Protection (NDEP) Bureau of Air Quality Planning (BAQP) operates a network of ambient air quality monitors at a variety of locations throughout the state of Nevada. The NDEP BAQP's ambient air monitoring network meets the minimum monitoring requirements for all criteria pollutants pursuant to 40 Code of Federal Regulations (CFR) 58, Appendix D. The NDEP BAQP's monitoring network is reviewed annually pursuant to 40 CFR 58.10 to ensure that the network meets the monitoring objectives defined in 40 CFR 58, Appendix D. The approval letter for the 2015 NDEP BAQP Annual Network Plan is included in Appendix A. Ambient air monitoring data is collected and data quality is assured in accordance with 40 CFR 58. This data is submitted to the United States Environmental Protection Agency's (U.S. EPA) Air Quality System (AQS). The data for 2015 was certified in April 2016. The Data Certification Letter was submitted to U.S. EPA Region IX in April 2016 as well, and is included in Appendix B.

1.1 SCOPE OF REPORT

In the summer of 2015, lightning strikes resulted in a number of large-scale wildland fires in the western United States (U.S.), burning more than 10 million acres in total (NICC, 2015). Emissions from these wildland fires caused exceedances of the 70 parts per billion (ppb) of ozone (O_3) 8-hour National Ambient Air Quality Standard (NAAQS)[1] at several air quality monitoring sites in western Nevada, including NDEPs monitoring location in Fallon, Nevada, approximately 60 miles east of Reno, Nevada.

The NDEP is requesting exclusion of the O_3 data from the Fallon air monitoring site that exceeded the NAAQS as an exceptional event under the U.S. EPA's regulation for *The Treatment of Data Influenced by Exceptional Events;* (81 FR 68216; U.S. EPA, 2015a, known as the Exceptional Events Rule (EER; 40 CFR Parts 50 and 51). The purpose of this report is to provide documentation in support of this request. The wildland fires in the western United States were natural events that caused exceedances of the federal standard for one of NDEP's Federal Equivalent Method (FEM) ozone monitors on August 20 and 21, 2015. The 8-hour average O_3 concentration reached 80 ppb at the Fallon air monitoring station in Churchill County (AQS Site Code 32-001-0002). This document demonstrates that the 8-hour ozone exceedances on August 20 and 21, 2015 at the Fallon monitoring site meet the requirements for having been influenced

[1] NAAQS are pollutant-specific levels set by the U. S. EPA to protect public health and welfare. The NAAQS for ozone is 0.070 parts per million averaged over 8 hours.

by an exceptional event as stipulated in the EER. Table 1 lists the 8-hour ozone concentrations at Fallon that are included in this request.

Table 1. Eight-hour Federal Ozone Exceedance Values at the Fallon Monitoring Site

Monitoring Site	AQS Number	Dates of Exceedance	Maximum Daily 8-hour Average O_3 Concentration (ppb)	Date of Maximum
Fallon	32-001-0002	08/20/2015	76	08/21/2015
		08/21/2015	80	

The elevated ozone concentrations observed on August 20 and 21, 2015 occurred as a result of the emissions from the wildland fires in the western U.S. The NDEP BAQP has submitted the 1-hour O_3 data from the affected monitors on those days to the U.S. EPA AQS database and has placed the appropriate AQS flags throughout the data to indicate that the data was affected by an exceptional event due to wildfire. Informational flags (IT) were also included for other ozone NDEP BAQP monitoring sites for the same time period. This flagging indicates that the ambient air quality data was influenced by the wildfire emissions and ensures that the data is properly represented in the regulatory process.

1.2 Exceptional Event Definition and Demonstration Criteria

The EER defines an exceptional event in 40 CFR Part 50 as an event that affects air quality, is not reasonably controllable or preventable, and is an event caused by human activity that is unlikely to recur at a particular location or is a natural event.

The following analysis will address this definition and provide documentation to establish that the 2015 wildfires met the criteria for classification as an exceptional event as set forth in 40 CFR Part 50. Specifically, this document provides evidence that the wildfires affected air quality by demonstrating that:

1. there was a clear causal relationship between the 8-hour O_3 concentrations at Fallon and the event;
2. the O_3 concentrations during the event were significantly higher than normal historical concentrations, and;
3. the 8-hour O_3 concentrations at Fallon would not have exceeded the standard without the emissions contributed by the wildfires.

In addition, documentation is provided demonstrating that these lightning-ignited wildfires were natural events whose emissions were not reasonably controllable or preventable. Finally, information regarding reasonable and appropriate actions taken to protect public health and to provide the public with an opportunity to review this analysis is included as Appendix C.

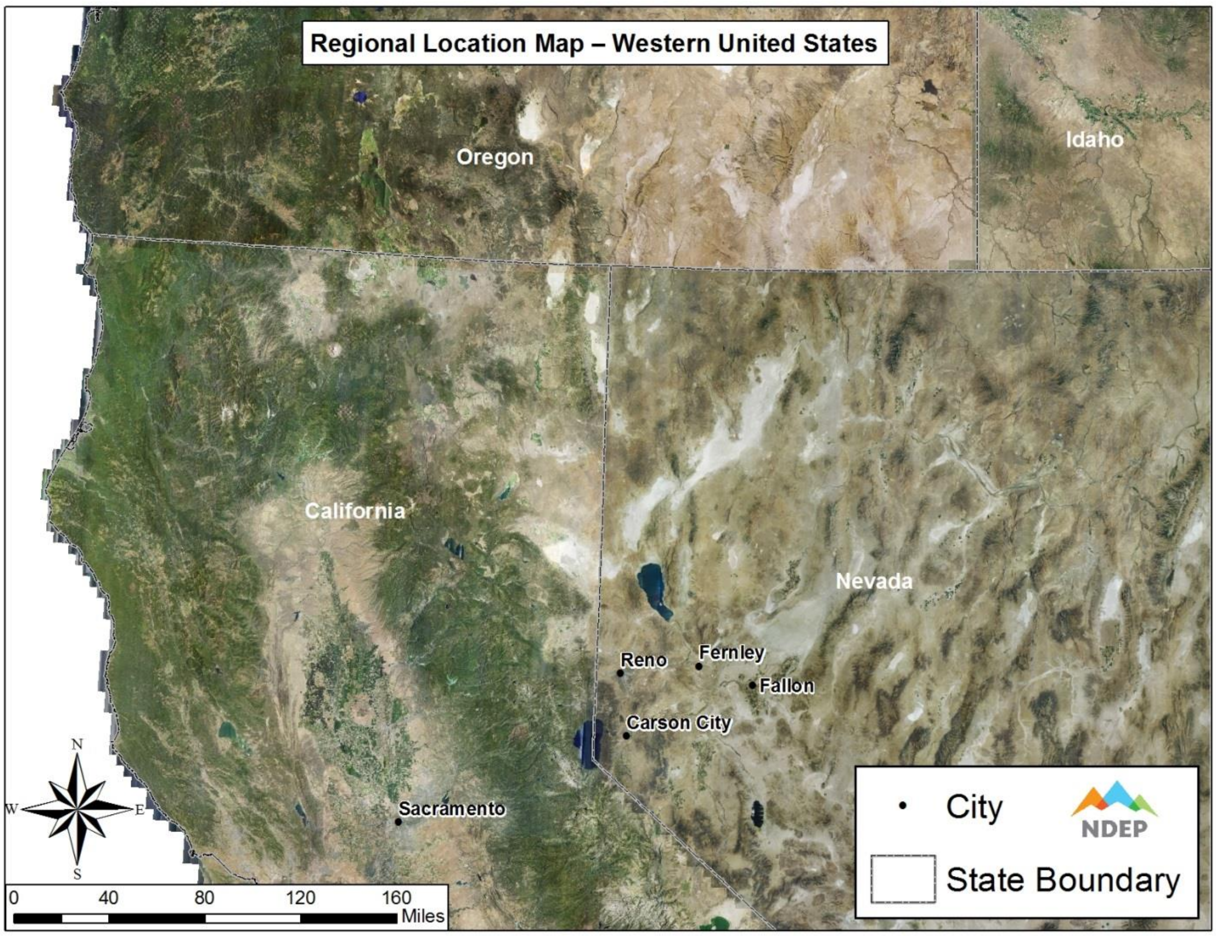
In addition to the EER, this document follows the guidance recently issued by the U.S. EPA regarding the treatment of O_3 concentration data affected by wildfire (*Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*; U.S. EPA, 2015b. Specifically, the elevated O_3 8-hour average concentrations at the Fallon air monitoring site on August 20 and 21, 2015 were significantly higher (by more than 25 ppb) than the average concentration for this site during the month of August (2011 through 2015). The measured maximum 8-hour averages for these two days were also significantly higher (by more than 25 ppb) than non-event related concentrations during the month of August at the Fallon site.

2.0 SETTING AND BASIC CONCEPTUAL MODEL

2.1 AREA DESCRIPTION

The Fallon Combined Statistical Area consists of Churchill County, Nevada. Churchill County covers approximately 4,930 square miles and has a population of 24,200 (USCB, 2016). The City of Fallon has a population of approximately 8,900. The NDEP is responsible for ambient air ozone monitoring in Fallon, as well as Carson City and Fernley (Figure 1).

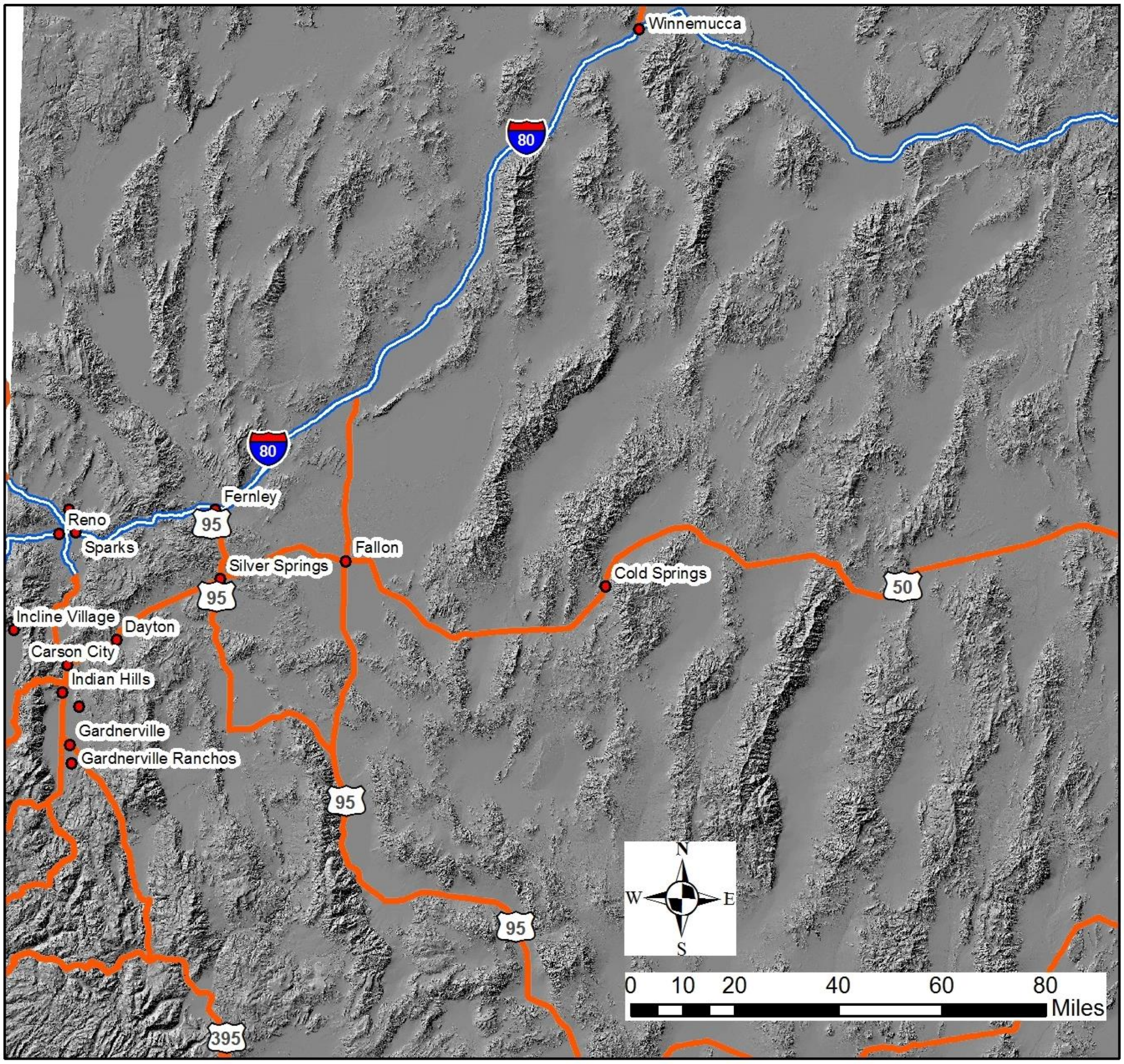
Figure 1. Regional Location Map



Fallon is part of Churchill County, Nevada, approximately 60 miles east of Reno, Nevada. The city is located in Lahontan Valley, in the southern portion of the Carson Sink, a low-lying dry lakebed that was once the terminus of the Carson River. The sink is currently fed by drainage canals of the Truckee-Carson Irrigation District, which provide water for the Stillwater Wildlife Management Area. Lahontan Valley is bordered by the Stillwater Range to the northeast; the Lahontan Mountains, Bunejug Mountains, White Throne Mountains, Desert Mountains, and Dead Camel Mountains to the south; the Virginia Range to the west; and the Hot Springs Mountains and West Humboldt Range to the northwest and north. Interstates 50 and 95 bisect

Lahontan Valley east-west and north-south, respectively. Both travel directly through Fallon (Figure 2).

Figure 2. Shaded Relief Map of West-Central Nevada



Lahontan Valley is part of the Basin and Range Physiographic Province, a region of internal drainage characterized by north- to northeast-trending mountain ranges separated by lower elevation valleys. The elevation in Fallon is 3,965 feet above mean sea level (amsl), and the surrounding mountains exceed 8,500 feet amsl.

Due to the rain shadow effect of the Sierra Nevada and other mountain ranges to the west and southwest, moisture associated with Pacific storms rarely reaches the valley. As a result, Fallon has an arid climate (an average of approximately five inches of precipitation per year), typical of the Great Basin region. Most of the precipitation in the area occurs in the winter (between December and May). The average daily maximum temperature is approximately 92 degrees Fahrenheit (°F) in July and approximately 44 °F in January. Average daily minimum temperatures vary from 54 °F in July to 18 °F in January.

Periods of high pressure and stagnant air masses, conducive to pollutant build up, can occur during both the winter and summer seasons. These climate conditions result in a seasonal pollutant pattern, with the highest ozone concentrations measured during the hot summer months.

2.2 Characteristics of Ozone Formation

Anthropogenic emissions contributing to ozone formation comprise volatile organic compounds (VOCs) and oxides of nitrogen (NO_x). The main sources of these emissions include mobile sources (cars, trucks, locomotives, off-road equipment) along with stationary and area sources, which include industrial processes, consumer products, and pesticides. Mobile source emissions dominate the anthropogenic emissions in Churchill County, accounting for the majority of the total NO_x inventory.

VOC and NO_x emissions over the last decade have remained fairly constant in Churchill County, and are well below 10 tons per day (tpd). In 2011 (the most recent National Emissions Inventory for which VOC and NO_x values are available), VOC and NO_x precursor emissions for Churchill County were estimated at 3 and 4 tpd, respectively. VOC and NO_x emissions have not changed significantly despite increases in population, vehicle activity, and economic development.

The ozone season in western Nevada occurs from May through October. In general, the synoptic (large-scale) weather conditions leading to elevated ozone concentrations occur with slow moving, high pressure weather systems, causing the air to subside, or sink. As the air sinks, it warms, which forms a temperature subsidence inversion (i.e., several hundred meters (m) above the surface) that stabilizes and dries the atmosphere. This process limits the vertical mixing of boundary layer air and traps pollutants below the height of the inversion. The process also limits cloud production, which increases ozone photochemistry. In addition, calm surface winds are conducive to high ozone concentrations because these conditions prevent the dispersion of pollutants.

2.3 Wildfire Description

During the spring of 2015, dry conditions plagued the western U.S., keeping precipitation below normal. In addition, temperatures were above normal. During the summer, an intense high pressure ridge formed and remained over the western part of North America, bringing hot and dry conditions to much of the western U.S. A period of relatively cool conditions developed in mid-summer, followed by a return of the upper ridge and extreme heat. Drought conditions continued to intensify and expand in the west, with severe to exceptional drought conditions across California. In northern California, the long-term drought and brief periods of hot and dry weather allowed fuels to return to drier than normal levels rather quickly in the absence of precipitation, leading to critical fire conditions by late summer.

With the extreme fire conditions and the number of fires burning, the Pacific Northwest Region had the highest priority in the nation for firefighting resources during these dates: July 25 and 26, August 14-31, and September 8-13, 2015. The Pacific Northwest Region was also under a Preparedness Level 5 (the highest, most severe level) from August 13 through September 4, 2015. By this time, northern California was experiencing unusually high numbers of wildfires and the National Preparedness Level was increased to 5 (USDA, 2015). California firefighters were assisted in their efforts to control these blazes by units from throughout the U.S.

Vast areas experienced smoke impacts, especially areas in northern California and western Nevada. Table 2 lists the large (>100 acres) wildfires in the western United States that were active between August 19 and August 21, 2015. The number of acres burned per day is included for fires that affected western Nevada ozone concentrations. Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) forward and backward trajectories were used to determine which of the fires impacted the Fallon ozone monitor on August 20 and 21, 2015 (Stein, 2015; Rolph, 2016). Trajectories were analyzed at 100, 700, and 1,500 m above ground level (agl) for all fires active in the western United States as well as from Fallon, Nevada. According to the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations,* the starting heights of trajectories should be higher than 100 m agl to avoid terrain interference, and below 1,500 m agl to stay within the mixed layer of the atmosphere (EPA, 2015b). Fires were determined to have affected the Fallon ozone monitor if forward trajectories from the fire origin overlapped with backward trajectories from the Fallon site on at least one of the two exceedance days. Fires highlighted in yellow in Table 2 impacted the Fallon ozone monitor on one of the two exceedance days. Fires highlighted in orange impacted the Fallon ozone monitor on both exceedance days. Figure 3 provides a map of fire locations.

Table 2. Large Fires in the Western United States Active between August 19 and August 21, 2015. Fires highlighted in yellow had a moderate impact on the Fallon ozone monitor; fires in orange had a significant impact on the Fallon ozone monitor.

Name	Fire Start		Total Acres Burned by Date		
	Latitude	Longitude	8/19/15	8/20/15	8/21/15
BENDIRE COMPLEX	43.989	-118.061	44,397	ND	ND
BIG LOST	46.963	-116.701	1,280	ND	ND
BOBCAT	45.338	-113.964	315	ND	ND
CABIN	34.265	-117.855	1,723	ND	ND

Name	Fire Start		Total Acres Burned by Date		
	Latitude	Longitude	8/19/15	8/20/15	8/21/15
CABIN CREEK	45.086	-112.479	895	ND	ND
CABLE CROSSING	43.321	-122.960	1,857	ND	ND
CANYON CREEK COMPLEX	44.284	-118.961	48,201	ND	ND
CARPENTER ROAD	48.005	-118.204	9,658	ND	ND
CLARK FORK COMPLEX	48.146	-116.183	2,850	ND	ND
CLEARWATER COMPLEX	46.223	-116.133	39,200	ND	ND
COLD SPRINGS	39.273	-117.784	4,012	ND	ND
COLLIER BUTTE	42.362	-124.107	8,300	9,000 +700	9,200 +200
CORNET-WINDY RIDGE	44.555	-117.643	103,540	ND	ND
COUGAR	44.609	-115.729	719	ND	ND
COUGAR CREEK	46.134	-121.374	23,900	ND	ND
COUNTY LINE 2	44.830	-121.377	63,600	ND	ND
CUESTA	35.323	-120.624	3,500	ND	ND
DEER	35.170	-118.766	311	ND	ND
EAGLE	45.005	-117.420	3,055	ND	ND
ELDORADO	44.323	-118.101	20,611	ND	ND
FIRST CREEK	47.881	-120.221	1,902	ND	ND
FORK COMPLEX	40.540	-123.138	35,165	36,285 +1,120	36,473 +188
GASQUET COMPLEX	41.846	-123.969	7,921	11,484 +3,563	12,841 +1,357
GOLD HILL	48.632	-118.016	550	ND	ND
GRAVES MOUNTAIN	48.633	-118.337	1,603	ND	ND
GRIZZLY BEAR COMPLEX	46.110	-117.679	12,000.9	ND	ND
HORSE	40.125	-124.076	250	ND	ND
HUMBOLDT COMPLEX	40.223	-123.656	4,883	4,883	4,883
JERUSALEM	38.828	-122.527	25,118	ND	ND
KANIKSU COMPLEX	48.424	-117.139	8,317	ND	ND
LACK CANYON	48.051	-120.113	6,761	ND	ND
LARKIN COMPLEX	46.929	-115.459	420.1	ND	ND
MAD RIVER COMPLEX	40.335	-123.383	26,462	30,084 +3,622	31,190 +1,106
MARBLE CREEK	47.190	-116.031	1,024	ND	ND
MARBLE VALLEY	48.384	-117.892	3,100	ND	ND
MCFARLAND CREEK	48.092	-120.133	4,708	ND	ND
MELTON 1	47.429	-114.391	3,303	ND	ND
MORRELL COMPLEX	47.313	-113.516	384	ND	ND

NAME	FIRE START		TOTAL ACRES BURNED BY DATE		
	LATITUDE	LONGITUDE	8/19/15	8/20/15	8/21/15
MOTORWAY COMPLEX	46.423	-115.602	15,116	ND	ND
MUNICIPAL COMPLEX	46.467	-116.239	23,476	ND	ND
NAPOLEON 1	48.107	-115.848	1,409	ND	ND
NATIONAL CREEK COMPLEX	43.038	-122.278	7,021	8,040 +1,019	8,880 +840
NICKOWITZ	41.469	-123.752	3,866	4,770 +904	4,922 +152
NORTH STAR	48.338	-119.002	55,000	ND	ND
NORTHEAST KOOTENAI COMPLEX	48.737	-114.867	2,600	ND	ND
NOT CREATIVE	47.575	-116.459	135	ND	ND
OKANOGAN COMPLEX	48.519	-119.662	54,838	ND	ND
PARKER RIDGE	48.907	-116.534	6,147	ND	ND
PHILLIPS CREEK	45.608	-118.061	2,601	ND	ND
RAPID	44.821	-115.918	1,690	ND	ND
REACH	47.814	-120.039	68,465	ND	ND
RENNER	48.779	-118.205	850	ND	ND
RIVER COMPLEX	40.913	-123.437	45,477	48,099 +2,622	50,424 +2,325
ROUGH	36.874	-118.905	31,402	ND	ND
ROUTE COMPLEX	40.642	-123.586	32,959	34,350 +1,391	34,543 +193
ROY	48.677	-118.849	120	ND	ND
SCOTCHMANS GULCH	46.408	-113.610	196	ND	ND
SLIDE	46.100	-115.446	2,400	ND	ND
SODA	43.118	-116.960	283,686	ND	ND
SOUTH COMPLEX	40.620	-123.448	22,517	22,807 +290	23,565 +758
STICKPIN	48.756	-118.461	41,586	ND	ND
STOUTS CREEK	42.924	-123.048	25,324	25,806 +482	26,188 +382
SUCKER CREEK	47.013	-112.634	2,740	ND	ND
TEPEE MOUNTAIN	48.656	-115.940	100	ND	ND
TEPEE SPRINGS	45.208	-116.248	6,610	ND	ND
THOMPSON DIVIDE COMPLEX	48.494	-113.981	13,995	ND	ND
WALKER	37.878	-119.159	3,715	ND	ND
WASH	46.078	-115.406	5,000	ND	ND
WEIGEL	48.441	-115.034	100	ND	ND
WEST SCRIVER	44.225	-116.030	576	ND	ND

NAME	**FIRE START**		**TOTAL ACRES BURNED BY DATE**		
	LATITUDE	**LONGITUDE**	**8/19/15**	**8/20/15**	**8/21/15**
WOLVERINE	48.226	-120.666	40,904	ND	ND

USDA, 2016; http://www.predictiveservices.nifc.gov/intelligence/intelligence.htm
ND: Not Determined
Numbers after the '+' indicate an increase in acreage burned from the previous day.

Figure 3. Large Wildfires in the Western United States Active on August 19, 2015.

Air quality in northern Nevada was moderate to poor intermittently throughout the summer of 2015 due to smoke from the wildfires in the western U.S. Many air quality monitors in northern

Nevada recorded elevated ozone concentrations, along with increased concentrations of particulate matter. Figures 4 and 5 provide satellite images illustrating the extent of the smoke impacts on August 20 and 21, 2015.

Figure 4. Satellite Imagery of Smoke Plume – August 20, 2015.

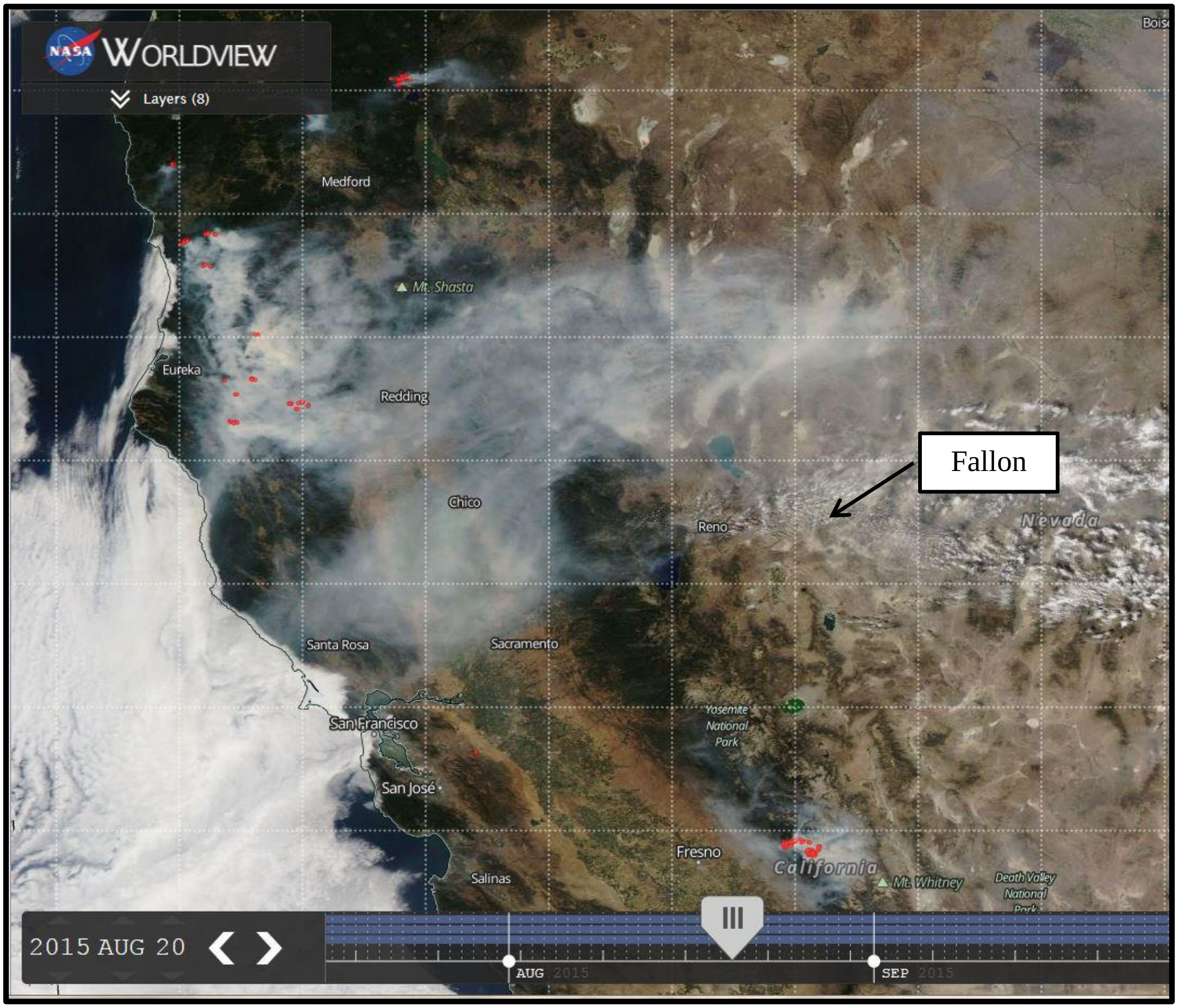
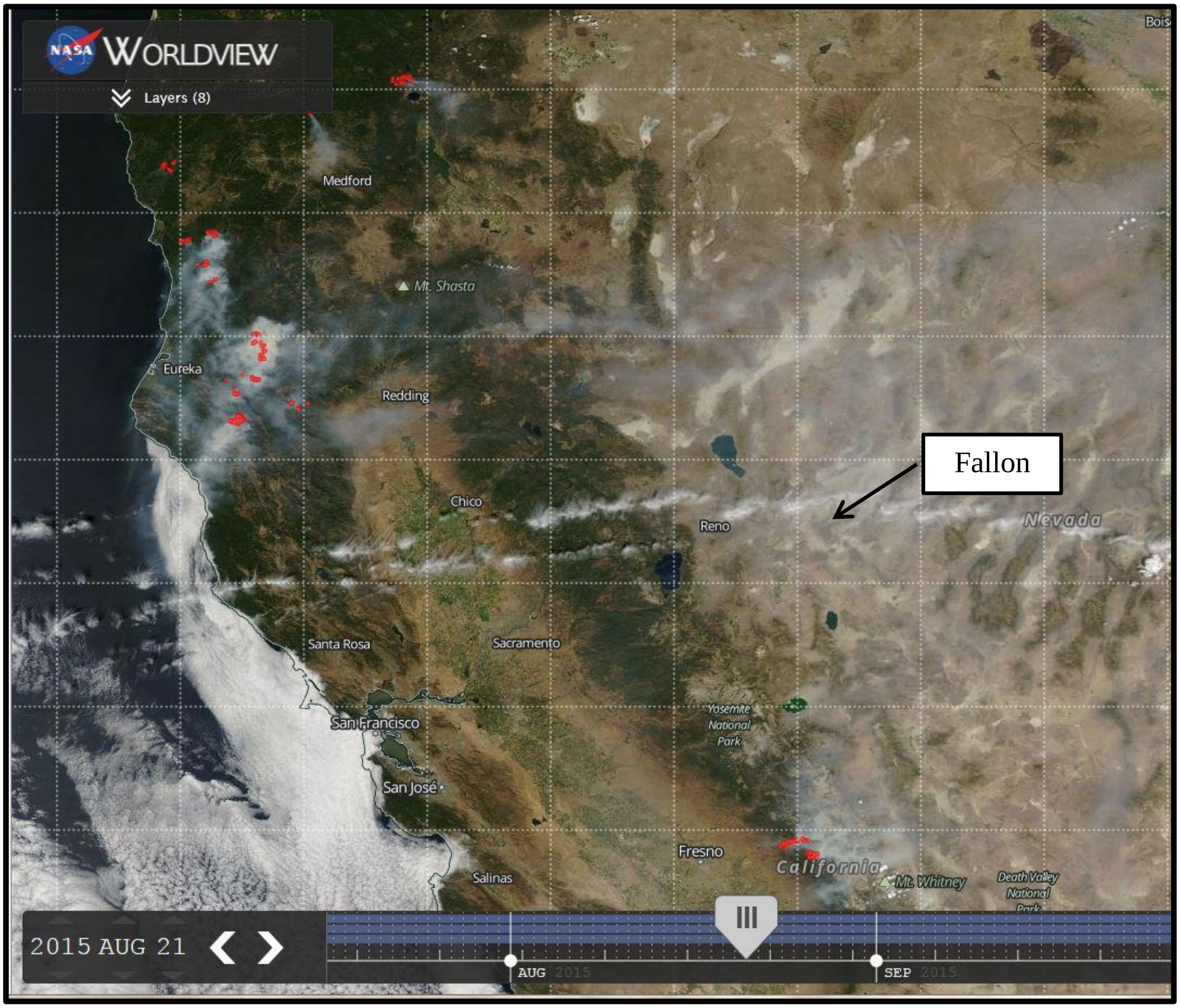


Figure 5. Satellite Imagery of Smoke Plume – August 21, 2015.



2.4 MONITORING

NDEP operates three ozone monitoring sites in northern Nevada; one each in Carson City, Fernley, and Fallon, Nevada (Figure 1). Ozone was elevated throughout much of northern Nevada while the wildfires were active. One of NDEP's ozone monitoring sites (Fallon) recorded ozone concentrations above the 8-hour standard. Ozone exceedances were also recorded at air monitoring sites in Reno, Nevada, within the Washoe County Air Quality Monitoring District.

2.5 WILDFIRE EFFECTS ON OZONE FORMATION

2.5.1 Research

Wildfires can generate both NO_x and VOC emissions, with different burning stages generating different types of emissions. Biogenic VOCs are generated by vegetation throughout the burning cycle. NO_x is generated primarily during the hot, flaming stage of the fire, while small reactive hydrocarbons, such as ethane and acetylene, are generated during the smoldering phase (Finlayson-Pitts and Pitts, 2000; Jaffe et al., 2008).

Very near fires, ozone concentrations can potentially be suppressed, despite the increase in ozone precursors generated by the wildfires. Bytnerowicz et al. (2010), Finlayson-Pitts and Pitts (2000), and Sandberg et al. (2002) provide several explanations why ozone can potentially be low at the fire sites: 1) thick smoke can prevent sufficient UV light from reaching the surface, thereby inhibiting photochemical reactions, and 2) the wildfire plume typically contains high nitrogen monoxide (NO) concentrations, which can titrate ozone concentrations. Downwind of the fire (or at the top of the plume; Sith et al., 1981, qtd in Sandberg et al., 2002), away from fresh NO sources and with reduced aerosol optical depth, considerable amounts of ozone can be generated. The plume does not need to be very far downwind of fire emissions to generate ozone. Sith et al. (1981) found ozone beginning 10 km downwind of wildfires, in plumes less than one hour old (quoted in Sandberg et al., 2002). Ozone and ozone precursors can also be transported quite far from a wildfire site (Finlayson-Pitts and Pitts, 2000 and Jaffe et al., 2008). Therefore, similar to the impacts of anthropogenic emissions in urban airsheds, the highest ozone concentrations due to wildfires are often found downwind of the area of greatest precursor emissions.

The impact of wildfires on ozone concentrations at both the local and regional level has been extensively evaluated in recent years. Field observations of ozone formation in smoke plumes from fires date back nearly 25 years when aircraft measurements detected elevated ozone at the edge of forest fire smoke plumes far downwind. More recently, aircraft flights through smoke plumes have demonstrated increased ozone concentrations of 15 to 30 ppb in California (Bush, 2008), while ozonesonde measurements in Texas found enhanced ozone aloft ranging from 25 to 100 ppb attributable to long-range transport of smoke plumes from Canada and Alaska (Morris, 2006).

In addition, air quality modeling has shown increased levels of ozone from a number of large fires. McKeen (2002) found that Canadian fires in 1995 enhanced ozone concentrations by 10 to 30 ppb throughout a large region of the central and eastern U.S.. Lamb (2007) found similar results simulating the impacts of fires in the Pacific Northwest in 2006, with increases of over 30 ppb. Junquera (2005) further found that within 10 km of a fire, ozone concentrations could be enhanced by up to 60 ppb. Finally, in one of the most recent studies, Pfister (2008) simulated the large 2007 fires in both northern and southern California. The author found ozone increases of approximately 15 ppb in many locations and concluded that "Our findings demonstrate a clear impact of wildfires on surface ozone nearby and potentially far downwind from the fire location, and show that intense wildfire periods frequently can cause ozone levels to exceed current health standards."

2.5.2 Conceptual Model of Ozone Formation from 2015 Wildfires

In Nevada, the summer months of July, August, and September are typically dominated by a large synoptic scale high pressure system over the western states. When this high pressure system is located over the four-corners area (Arizona, New Mexico, Colorado, and Utah), southerly or southeasterly winds bring subtropical moisture into the southwestern deserts, and often into northern Nevada as well. Such flows commonly produce thunderstorms, which can be accompanied by gusty winds, rain, and sometimes hail. These months are collectively referred to as the "monsoon season."

During the period of August 17-21, 2015, when smoke from northern California fires moved eastward into northern and northwestern Nevada, the high pressure system was located over southern California. This position changes the prevailing winds aloft from southerly/southeasterly to westerly or northwesterly.

Substantial amounts of NOx and VOCs were generated from the summer 2015 wildfires, corresponding to the 8-hour ozone exceedances at Fallon on August 20 and 21, 2015. Surface winds in Fallon on these days were generally light, and from the southwest to northwest (Figures 6 and 7, Appendix D). These winds transported wildfire precursor emissions from multiple upwind locations to the Fallon area. In addition to surface transport, due to the buoyancy of fire plumes, substantial amounts of precursors were emitted aloft by the wildfires.

Figure 6. Wind Rose for Fallon Naval Air Station, August 20, 2015

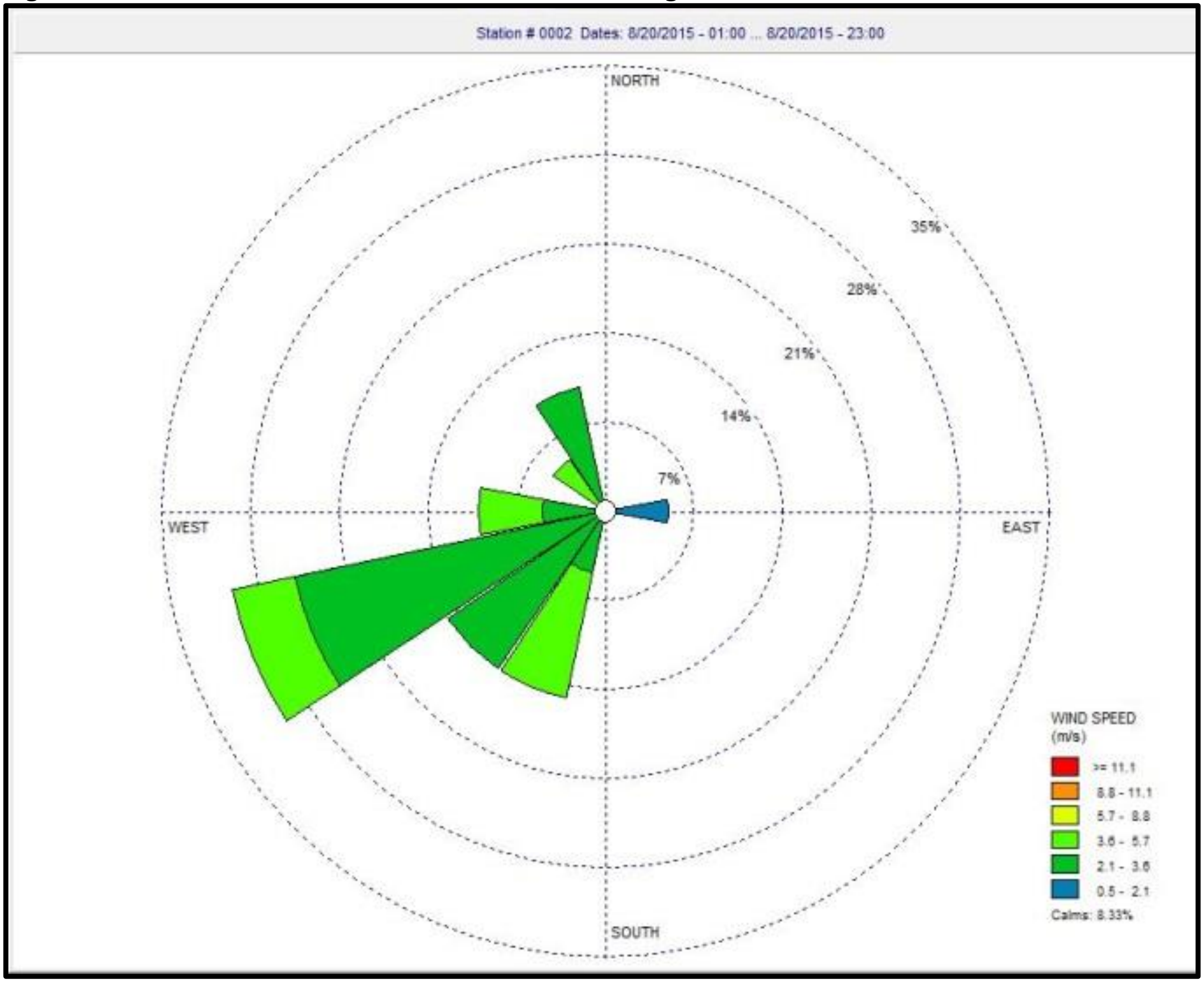
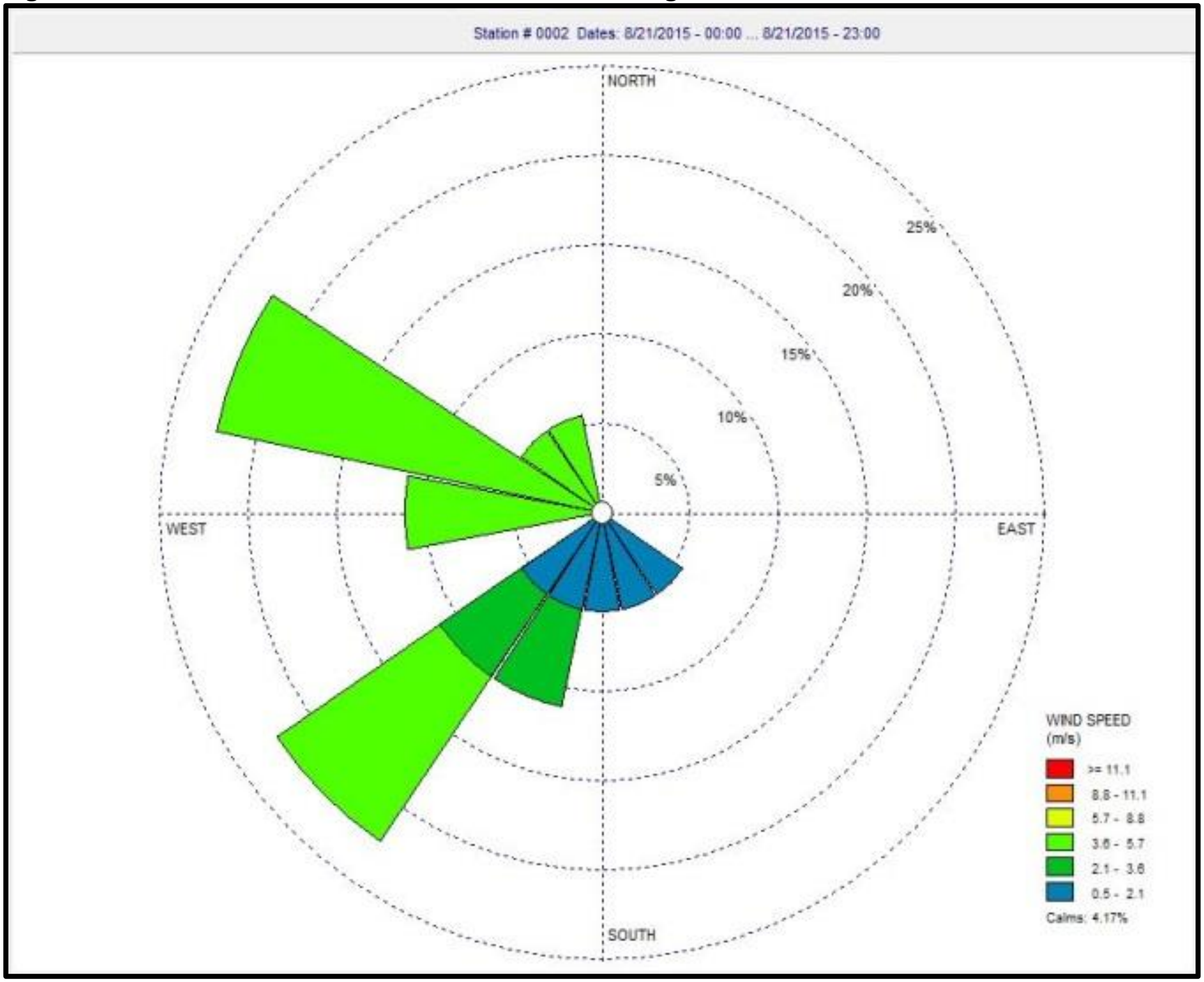


Figure 7. Wind Rose for Fallon Naval Air Station, August 21, 2015



Due to typical daytime photochemistry, the increased levels of wildfire-related precursor emissions in northern Nevada resulted in enhanced levels of ozone throughout the region, including Fallon. Although these surface wind patterns would also have transported anthropogenic emissions to Fallon, the meteorological conditions that existed on the two exceedance days were not sufficient to have caused a 8-hour ozone exceedance without the added burden of the additional wildfire-related precursor emissions.

Although, as discussed earlier, NO from fires can result in ozone titration very close to the source of a fire, Fallon is sufficiently far enough downwind (400 kilometers (km)) that a reduction in ozone concentrations due to this phenomena was unlikely. In addition, while the increased smoke from the fires may have reduced the amount of solar insolation, thereby potentially reducing photochemical activity, this was offset by the substantially increased levels of ozone precursors generated by the fires, resulting in a net ozone enhancement.

Section 3 provides a more detailed discussion of the specific meteorological conditions that existed on each of the two 8-hour ozone exceedance days included in this request to support the clear causal connection between the wildfires and the ozone concentrations. Section 3 also provides information to demonstrate that the 8-hour ozone concentrations at Fallon on each of these days would not have exceeded the federal standard without the impacts of the wildfire emissions.

3.0 CLEAR CAUSAL RELATIONSHIP

This section demonstrates a clear causal relationship between the occurrence of the wildfires and the 8-hour ozone exceedances that occurred at the Fallon monitor on August 20 and 21, 2015. Specifically, this section provides evidence that: 1) the wildfires occurred, 2) the smoke plume from these wildfires reached the Fallon monitor, and 3) that the pollutants within the smoke plume increased ozone concentrations at the Fallon monitor.

This comprehensive weight of evidence includes: documentation of the extensive nature of the fires, a meteorological analysis, satellite imagery, particulate matter smaller than 2.5 micrometers in diameter ($PM_{2.5}$) air quality data from upwind monitoring locations in Washoe County, ozone air quality data, ozone chemistry leading to elevated 8-hour ozone concentrations, forward and backward trajectories showing that emissions from the wildfires were transported to the Fallon monitoring location, and finally a discussion of how the 8-hour ozone concentrations exceed the normal non-event related concentrations for the Fallon ozone monitor.

3.1 DESCRIPTION OF WILDFIRES

In the summer of 2015, storm systems moved through northern California and southern Oregon, generating numerous thunderstorms that included cloud-to-ground lightning strikes. Because of record dry conditions, these lightning strikes started a large number of wildfires in the western U.S., eventually burning more than 10 million acres. Detailed fire information is provided in Table 2.

3.2 TRANSPORT PATTERNS

The hundreds of active wildfires in the summer of 2015 resulted in smoke, particulate matter, and ozone precursor emissions which spread throughout the western U.S.. Overall, the weather-related factors responsible for bringing fire emissions to Fallon were relatively light winds from the northwest, which transported wildfire emissions into northern Nevada.

During the daylight hours on August 20 and 21, 2015, prevailing surface winds in Fallon were from the southwest to northwest (Figures 6 and 7, respectively) and prevailing upper-level winds from the fires were from the west and northwest (Appendix D). These winds carried emissions from wildfires in northern California and the Pacific Northwest into northern Nevada.

Weather maps for August 20 and 21, 2015 are provided in Appendix D. The maps show the position of an upper level high pressure system near southern California producing moderate westerly or northwesterly upper level winds. Surface maps are similar for both exceedance days, with surface thermal lows near Las Vegas, extending across the central valley of California into northern California. Such situations generally produce light and often variable surface wind conditions in northern Nevada.

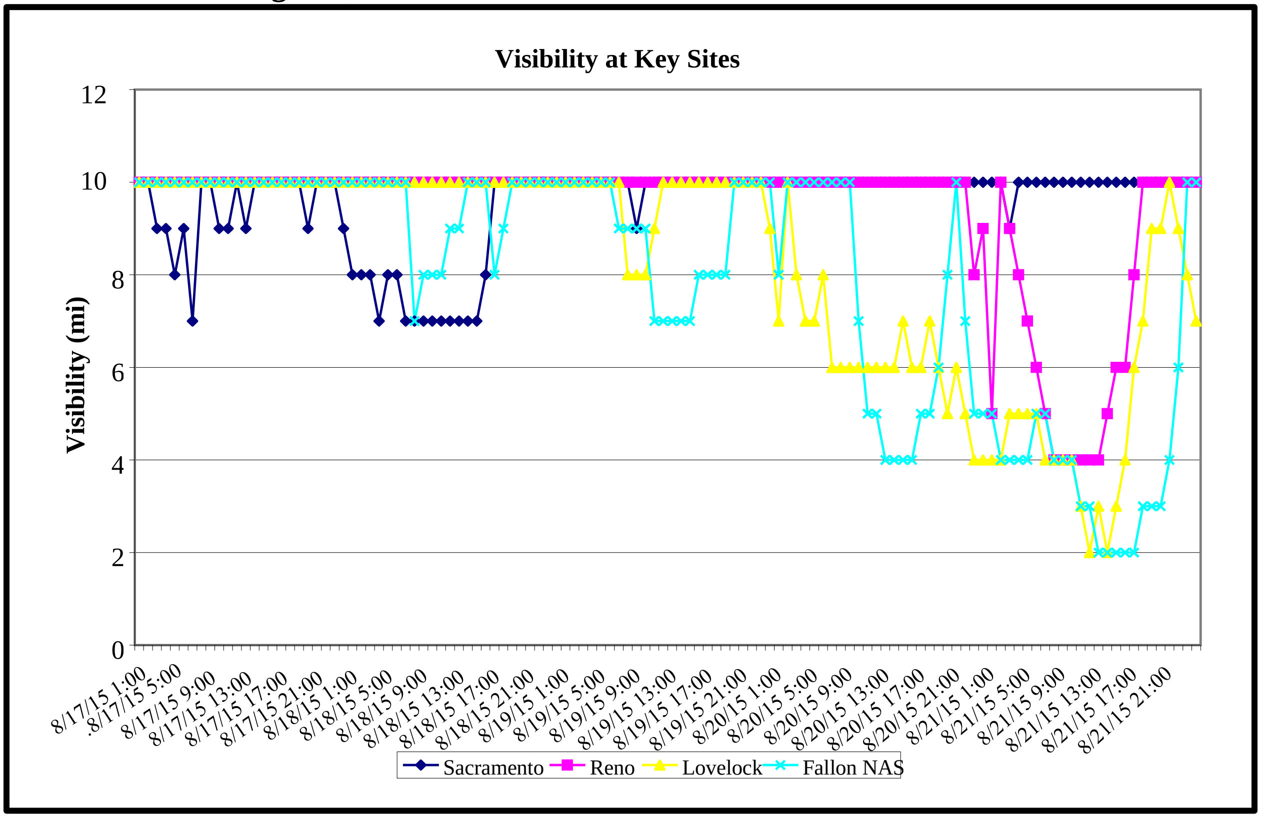
In the desert portions of Nevada, visibilities are typically very good. Reductions in summer visibility to levels below 10 miles generally occur under one of three conditions: (1) heavy rain from thunderstorms; (2) blowing dust from thunderstorm downdrafts that can cause winds to exceed 50 miles per hour; or (3) smoke from wildfires. Appendix D shows the hourly weather history and observations from the Fallon Naval Air Station (NAS) weather station from August 17 to August 22. It is quite indicative that visual observations for smoke were reported only during the 20 and the 21, coincident with the highest values of O_3 recorded by the air monitoring station in Fallon.

There were no thunderstorms during this period, therefore any reductions in visibility over wide areas would be convincing evidence of smoke plume impacts. Visibilities are typically recorded using standard procedures at airports. In this analysis, four airport locations were used: Sacramento (an upwind location), Reno, Lovelock, and Fallon NAS.

Hourly visibility readings are shown in Figure 8. Although maximum visibilities commonly exceed 10 miles, especially in the deserts, standard visibility reporting procedures put the maximum reportable value at 10 miles. Anything below 10 miles is suggestive of a visibility-reducing event.

Sacramento, nearest to the Jerusalem fire, showed reduced visibilities on August 17 and 18, 2015, but thereafter did not have any hour below 10 miles, except for 0300 on August 21, 2015 when the visibility dropped to nine miles (Figure 8; Appendix D).

Figure 8. Visibility in northern Nevada and Sacramento, California – August 17 through 21, 2015.



Source: https://www.wunderground.com/history/

If the smoke traveled from west to east across the Sierra Nevada Mountains, it would follow that visibilities would be affected at locations sequentially from west to east. That is not the case in this situation. Visibility reductions on August 18, 2015 occurred initially at Fallon, the easternmost airport of the three Nevada airports plotted. For this to occur, one of two scenarios is possible: (1) the smoke plume was aloft over Reno and Lovelock and mixed to the ground by the time it reached Fallon. Or, more likely, (2) the plume moved eastward from extreme northern California into extreme northern Nevada, and then fanned out in a southeast direction affecting Fallon before Lovelock or Reno.

Greater smoke plume impacts were observed on August 19, 2015, as depicted by even lower visibilities (down to seven miles at times) observed at both Fallon and Lovelock. This suggests that the plume was moving more directly to the southeast and that both locations were in the path of the plume.

On August 20, 2015, visibility at Lovelock decreased to six miles during the day and further down to four miles by the end of the day. At Fallon, visibility was below six miles for many of the afternoon hours, but had a brief increase in the late evening, suggesting variability in the plume density. Also late in the evening, Reno showed the first indications of visibility below 10 miles.

Visibility on August 21, 2015 indicates a broad, widespread smoke event over most of northwestern Nevada. Reno visibility was below 10 miles for most of the day, improving in the evening. Minimum visibility was down to four miles for several hours beginning in the morning and continuing into the afternoon. At Lovelock, visibility was below 10 miles all day, except for one hour late in the evening. The lowest visibility was two miles for two hours in the afternoon, indicating very dense smoke impacts for much of the day, steadily improving in the evening. The worst visibilities were observed at Fallon, where visibility was two miles for five consecutive hours, and four miles or less for most of the day, improving considerably in the evening, suggesting the end of the smoke episode.

From a meteorological perspective, using visibility as a reasonable surrogate for smoke density, Fallon was the most impacted by the northern California smoke plume, with visibility impacts noted on the last four of the five days analyzed. Lovelock was the next most impacted, showing reduced visibilities on the last three days analyzed. Reno was impacted most notably on the August 21, 2015 with smoke impacts, from a visibility perspective beginning late on August 20, 2015.

To further demonstrate that smoke from the wildfires in the western U.S. impacted the Fallon ozone monitoring site, trajectory analyses were created using North American Mesoscale Forecast System 12-km meteorological data. Forward trajectories were used to identify which fires active on August 19 and 20, 2015 impacted the Fallon ozone monitor on August 20 and 21, 2015 (Table 2). The forward trajectories were initiated at 1800 Coordinated Universal Time (UTC; 1000 Pacific Standard Time (PST)) on August 19 and 20, 2015, from 100, 700, and 1,500 m agl, and were run forward for 24 hours. Backward trajectories were initiated from the Fallon ozone monitoring site beginning at 1800 UTC (1000 PST) August 20 and 21, 2015, also from 100, 700, and 1,500 m agl, for 24 hours.

Many of the wildfires burning in the western United States during the summer of 2015 were more than 400 km away from the Fallon ozone monitor. The emissions from the fires therefore traveled a considerable distance, including passing over significant topographic features. Because of this distance, as well as the heat of the plumes themselves, the smoke plumes dispersed upward into the atmosphere. To account for this vertical motion, and the fact that the HYSPLIT models do not account for turbulence or vertical mixing within the troposphere, trajectories were generated at 100 m, 700 m, and 1,500 m agl. These heights are representative of the base, middle, and top of the typical daytime planetary boundary layer, and are consistent with the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events* *that May Influence Ozone Concentrations,* The 700 m agl forward trajectories and the 100, 700, and 1,500 m agl backward trajectories are shown in Figures 9 and 10; all HYSPLIT trajectories are included in Appendix E.

Figure 9. Smoke Plumes, Wind Rose, and HYSPLIT Trajectories for August 20, 2015

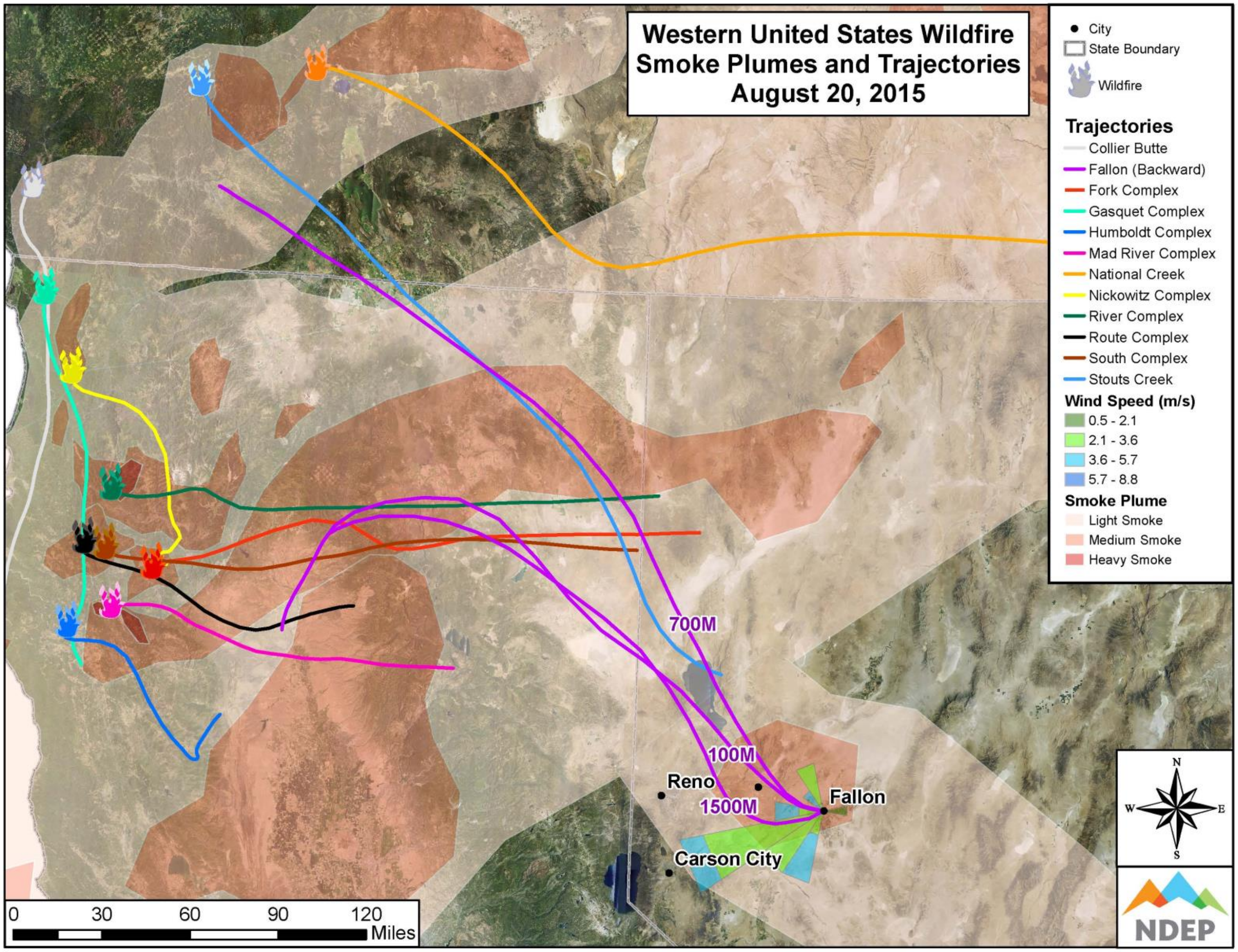
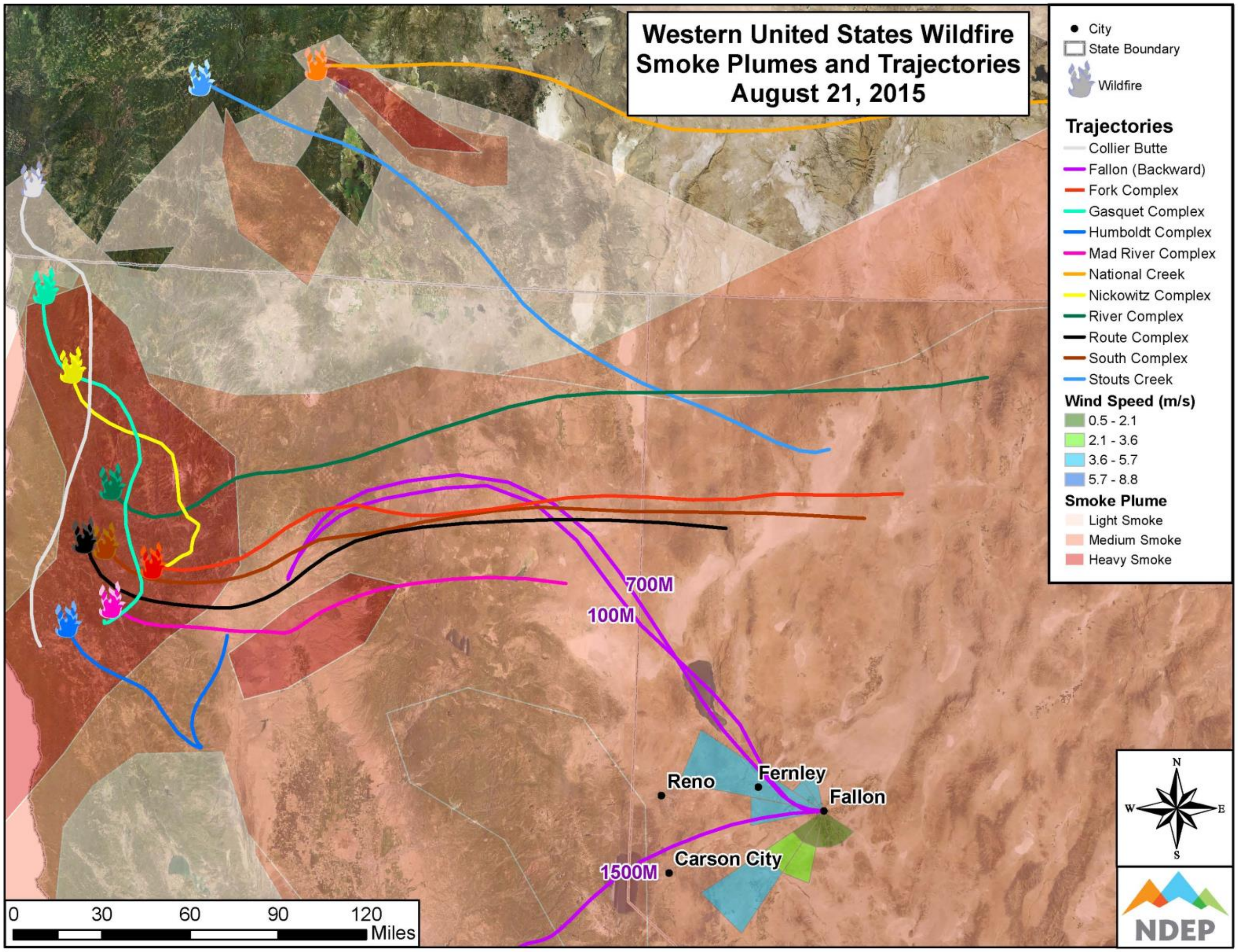


Figure 10. Smoke Plumes, Wind Rose, and HYSPLIT Trajectories for August 21, 2015



The backward trajectories from the Fallon ozone site overlap with the forward trajectories from many of the western U.S. wildfires (Figures 9 and 10, Appendix E). Although some of the fires only impacted the Fallon ozone monitoring site one on of the two exceedance days, the forward trajectories for both days are included for all fires determined to have affected the Fallon site.

3.3 $PM_{2.5}$ CONCENTRATIONS AND SPECIATION

$PM_{2.5}$ is directly emitted during combustion. Elevated concentrations of $PM_{2.5}$ were measured at air monitors in Washoe County between August 18 and 22, 2015, providing an important indicator that emissions from the wildfires reached ground level monitors in northern Nevada. Speciation data from the Washoe County $PM_{2.5}$ samples show elevated levels of organic and elemental carbon, also indicative of wildfire smoke (WCAQMD, 2016).

3.4 OZONE CHEMISTRY AND CONCENTRATIONS

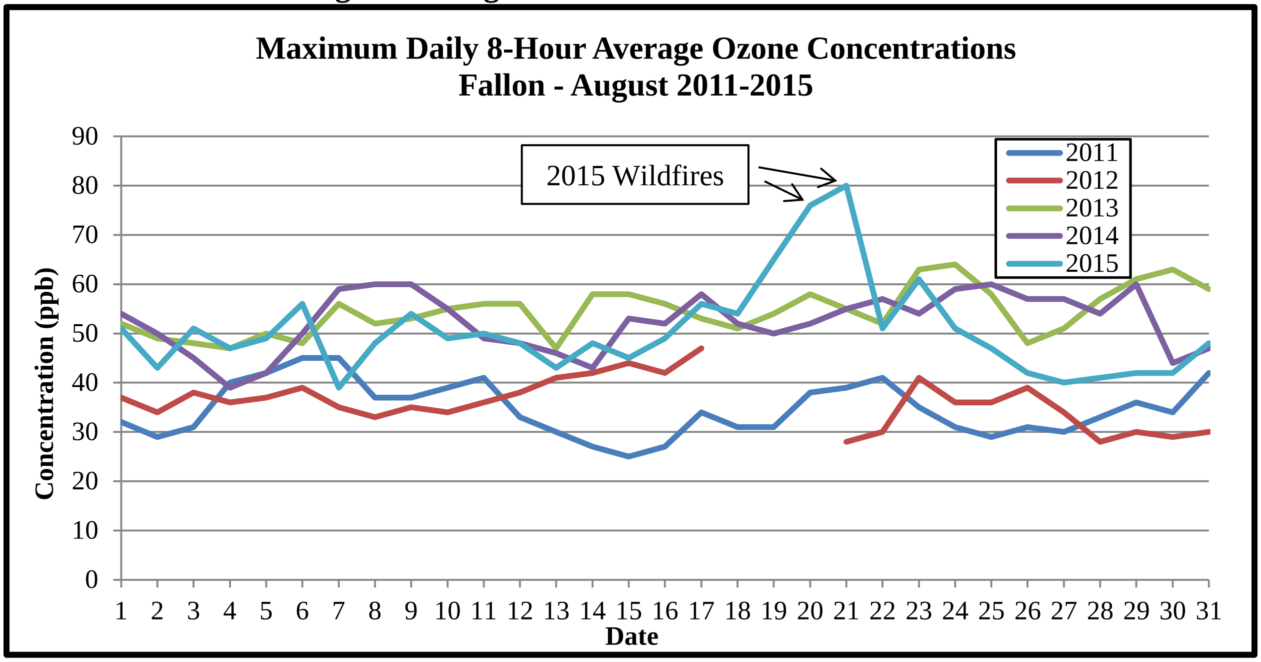
The increased precursor emissions from the fires throughout the western U.S. resulted in substantial amounts of ozone formation, leading to the 8-hour ozone exceedances at Fallon on August 20 and 21, 2015. Fallon was far enough downwind of the fires that their primary impact was to increase ozone due to the large amount of wildfire-related precursors, rather than decrease ozone due to either near-source NO titration or reduced solar insolation from smoke. Section 2 summarizes the key mechanisms by which emissions from wildfires can increase ozone, as well as past research that documents increases in ozone formation downwind of wildfires.

On August 20 and 21, 2015 the Fallon monitor had the highest ozone concentration in northern Nevada, with daily 8-hour maximums of 76 and 80 ppb, respectively. The daily maximum 8-hour ozone concentrations on August 20 and 21, 2015 were more than 25 ppb higher than the average and median maximum daily 8-hour ozone concentrations historically measured during the month of August at the Fallon site (2011 through 2015). The measured concentrations were more than three standard deviations higher than the mean ozone concentrations at the site for the month of August. In addition to the exceedance at Fallon, ozone was elevated throughout much of northern Nevada; air quality monitors in Washoe County also recorded exceedances of the 8-hour ozone standard.

3.5 BEYOND HISTORICAL AND BACKGROUND CONCENTRATIONS

Ozone concentrations in western Nevada are historically at their highest during the summer months. The measured 8-hour ozone concentrations at the Fallon monitoring site on August 20 and 21, 2015 were significantly higher than the average and median concentrations for the month of August, as well as for similar non-event day concentrations (Figure 11).

Figure 11. Maximum Daily 8-Hour Average Ozone Concentrations at the Fallon Ozone Monitoring Site – August 2011 - 2015



Historical data from the Fallon site show that the average ozone concentration for August from 2011 through 2015, (excluding August 20 and 21, 2015) is 45.4 ppb. This data is summarized in Table 3 and shown graphically in Figure 12.

Table 3. August Maximum Daily 8-Hour Average Ozone Statistics for Fallon

	2011-2015		2011	2012	2013	2014	2015	
	All Data	No Fire					All Data	No Fire
Mean	45.8	45.4	34.7	36.0	54.5	52.3	50.5	49.0
Median	47.0	47.0	34	36	55	53	48	49
Std. Dev.	10.5	9.9	5.4	4.9	4.8	5.9	9.4	6.1
Max.	80	65	45	47	64	60	80	65

Concentrations are in ppb.

Figure 12. Historical Data – August Ozone FEM Mean and Maximum Daily 8-Hour Average Concentrations for Fallon

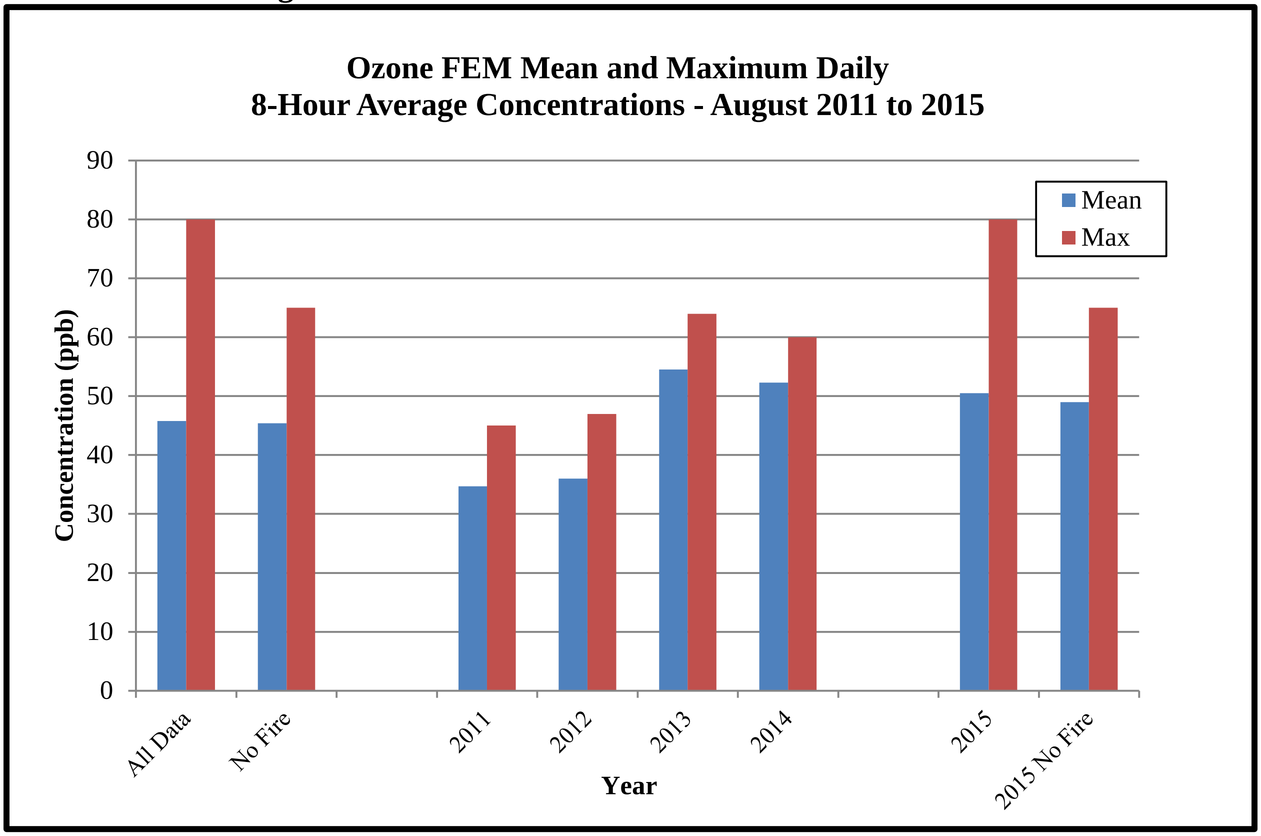
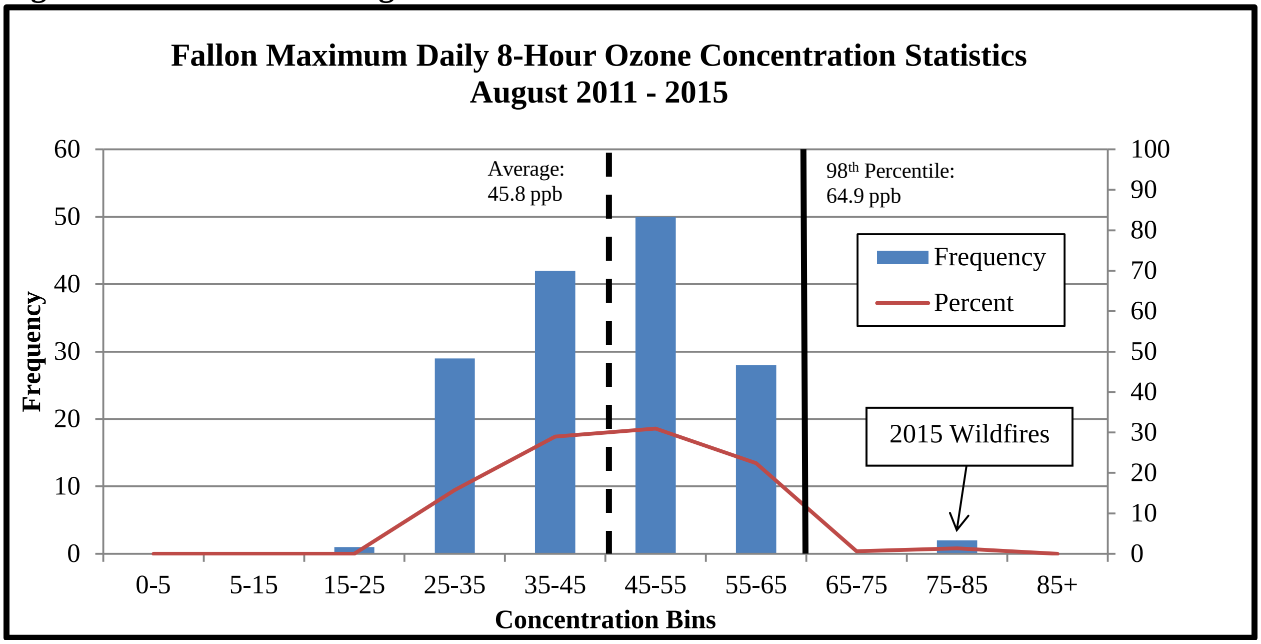


Figure 13 shows the number of August days over the five-year period 2011 through 2015 when the maximum 8-hour ozone concentration fell within established concentration bins of 10 ppb. The curve on the graph represents the percentage for days that fall within each concentration bin. Both wildfire exceedance days (August 20 and 21, 2015) exceed the 98th percentile (Figure 13).

Figure 13. Historical August Ozone Concentrations at Fallon



To NDEP's knowledge, there were no other unusual local ozone precursor emissions in or upwind from Fallon before or during the exceedance days.

4.0 SUMMARY

Hundreds of wildfires were burning across the western U.S. prior to and during the 8-hour exceedance at the Fallon ozone monitoring site on August 20 and 21, 2015. This summary documents the transport of emissions from the fires to northern Nevada. Wildfire emissions transported both at the surface and aloft affected northern and western Nevada on August 20 and 21, 2015, causing the 8-hour ozone exceedance at Fallon.

This document has demonstrated a clear causal relationship based on the following evidence:

- Meteorological and trajectory analyses document the transport of smoke and emissions from western U.S. wildfires, demonstrating that these emissions reached northern and western Nevada, including Fallon;

- Satellite images show evidence of smoke reaching Fallon. Airport observations document smoke and limited visibility, indicating that the smoke mixed down to the surface;

- Evidence of broad surface level impacts of the wildfires is further demonstrated by increased $PM_{2.5}$ concentrations in Washoe County, upwind of the Fallon site;

- Pollution in the plume increased ozone concentrations consistent with the science of the conceptual model for the event. Ozone levels were anomalously elevated throughout northern Nevada, including the exceedance at Fallon. This regional increase in ozone, consistent with the extent and timing of increase in $PM_{2.5}$, indicates that it is more likely that the fire emissions increased ozone due to increased precursors, rather than decreased ozone due to decreased solar insolation or increased ozone titration; and

- The exceedances of 80 and 76 ppb at Fallon are well above normal historical levels. These are the two highest concentrations recorded for this site within the past five years; these exceedances are beyond historical, non-event concentrations.

5.0 CRITERIA FOR THE DEFINITION OF AN EXCEPTIONAL EVENT

The criteria in 40 CFR §50.1(j) for an event to meet the definition of an exceptional event need to be met for the measured exceedances to qualify for exclusion. These criteria are:

- The event affects air quality;
- The event is not reasonably controllable or preventable; and
- The event is unlikely to reoccur at a particular location or [is] a natural event.

5.1 AFFECTS AIR QUALITY

As stated in the preamble to the EER, the event in question is considered to have affected air quality if it can be shown that there is a clear causal relationship between the monitored exceedance and the event, and that the event is associated with a measured concentration in excess of normal historical concentrations. These criteria are demonstrated in Section 3. The media releases provided in Appendix C also provide evidence that the wildfires affected air quality in the vicinity of the Fallon monitor. Given the information presented in Sections 3 and 4, the NDEP concludes that the wildfires burning in the western U.S. during late August 2015 affected air quality at the Fallon ozone monitoring site.

5.2 NOT REASONABLY CONTROLLABLE OR PREVENTABLE

The EER defines a wildfire as an unplanned, unwanted wildland fire "such as fires caused by lightning…" The fires discussed in Section 2 that caused the exceedances in this request were caused by lightning, and therefore qualify as wildfires.

A determination of whether a particular event was reasonably controllable or preventable depends on the specific facts and circumstances surrounding the event and must be determined on a case by case basis. The evidence presented in Section 2 demonstrates that the events in question were unplanned, lightning-ignited wildfires that directly emit ozone precursors. Therefore, the emissions from the wildfires were not reasonably controllable or preventable.

5.3 NATURAL EVENT

The events shown to cause these exceedances were direct emissions of ozone precursors from unplanned lightning-ignited wildfires in August 2015. The wildfires therefore qualify as natural events.

6.0 PROCEDURAL REQUIREMENTS

6.1 FLAGGING OF DATA

The NDEP BAQP has submitted the ozone data from the Fallon monitor to the U.S. EPA AQS database and has placed the appropriate flags on the data indicating that the data was affected by exceptional events due to wildfires (Flag RT, requesting exclusion due to wildland fires). Informational flags (IT) were also included for other NDEP BAQP ozone monitoring sites for the same time period. Such flagging ensures that the air quality data is properly represented in the overall air quality planning process.

6.2 PUBLIC OUTREACH DURING EVENT

An air agency requesting exclusion of air quality data affected by an exceptional event must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards. At a minimum, the agency must:

- Provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard;
- Provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and
- Provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events.

The public was notified of air quality being affected by ozone from the western U.S. wildfires via Air Quality Index (AQI) updates, National Weather Service Smoke Text Products, and NDEP's public website. The AQI maps and Smoke Text Products are provided in Appendix C.

6.3 PUBLIC COMMENT PERIOD

The NDEP BAQP has prepared this documentation to demonstrate that these exceedances were due to wildland fire natural events, in accordance with the U.S. EPA EER. The documentation in support of this demonstration and request for the treatment of the data associated with these exceedances as exceptional events was posted on the NDEP website at http://ndep.nv.gov/admin/public.htm requesting review and comment by the public for a minimum of 30 days. Public comments were directed to:

Sheryl Fontaine, Ambient Air Monitoring Branch
Nevada Division of Environmental Protection
Bureau of Air Quality Planning
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
Email: sfontaine@ndep.nv.gov

7.0 REFERENCES

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APPENDIX A

NDEP BAQP Annual Network Plan Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

OCT 28 2015

Mr. Phillip Shoopman
Chief, Bureau of Air Quality Planning
Nevada Division of Environmental Protection
901 south Stewart Street, Suite 4001
Carson City, Nevada 89701

Dear Mr. Shoopman:

Thank you for your submission of the 2015 *Ambient Air Monitoring Network Plan* for the State of Nevada in June 2015. 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.

We also want to thank you for your timely submission of the 2015 *Five Year Ambient Air Monitoring Network Assessment* for the State of Nevada, as required under 40 CFR Part 58.10. We recognize that preparing the network assessment was a significant project and we appreciate your effort.

The recently revised ozone NAAQS, finalized on October 1, 2015, includes language that revokes all existing seasonal ozone waivers upon the effective date of the final rule. EPA Region 9 will consider all previously approved ozone season waivers effective until December 31, 2015. In advance of the 2016 ozone monitoring season (January – December), EPA Region 9 recommends that agencies seeking new ozone waivers for the 2015 8-hour Ozone NAAQS of 0.070 ppm submit waiver requests no later than December 1, 2015.

If you have any questions regarding this letter or the enclosed comments, please feel free to contact Meredith Kurpius at (415) 947-4534 or Michael Flagg at (415) 972-3372.

Sincerely,

Gretchen Busterud
Acting Deputy Director, Air Division

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: Mike Elges, NDEP
cc (via email): Daren Winkelman, NDEP

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.

- 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 Rows 4 and 16):
    - Shutdown of Harvey CO SLAMS monitor

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
Modifications to SLAMS network	3	Insufficient information to judge
Sampling schedule for $PM_{2.5}$ - applies to year-round and seasonal sampling schedules	31	Insufficient information to judge
Designation of a primary monitor if there is more than one monitor for a pollutant at a site.	15	Insufficient information to judge
FRM/FEM/ARM $PM_{2.5}$ QA collocation	23	Insufficient information to judge
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.	19	Insufficient information to judge
Distance of monitor from nearest road	74	Not meeting requirement
Traffic count of nearest road	75	Not meeting requirement
Distance from supporting structure	78	Insufficient information to judge
Distance from obstructions not on roof (horizontal distance to the obstruction and vertical height of the obstruction above the probe should be provided)	80	Insufficient information to judge
Monitor type for each monitor, and Network Affiliation(s) as	69	Incorrect in one instance

appropriate		
Scale of representativeness for each monitor as defined in Appendix D	70	Incorrect in one instance
Parameter code for each monitor	71	Incorrect in one instance
Basic monitoring objective for each monitor	67	Incorrect in one instance

B. Additional Items Requiring Attention

- [Item 21] Minimum monitoring requirements for $PM_{2.5}$ only apply to Metropolitan Statistical Areas. Since Gardnerville Ranchos is a Micropolitan Statistical Area, there are no monitors currently required for this area by 40 CFR 58 Appendix D. Also, as a general note, SPMs do not count towards meeting minimum monitoring requirements. Also, please note that the requirement for population is by MSA, not county.

  The minimum monitoring requirements for $PM_{2.5}$ are specified in 40 CFR 58 Appendix D 4.7.1(a): "State, and where applicable local, agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in Table D-5 of this appendix." Please correct Table 2 to reflect the number of SLAMS sites, rather than monitors.

  According to information provided in the site tables, Table 2 should indicate that there is 1 active site in the Carson MSA and either remove the for Gardnerville Ranchos or list 0 active sites, as the only monitor is not a SLAMS, but an SPM.

- [Item 22] Since there are 0-1 $PM_{2.5}$ SLAMS sites required for the Carson City MSA, 40 CFR Appendix D 4.7.2 requires 0-1 continuous monitor in the MSA. No information was given in the site table to indicate whether the continuous monitor is primary.

- [Item 25] There is a in the site tables called "Suitable for $PM_{2.5}$ comparison", though this is likely the asking for "suitable for annual $PM_{2.5}$ comparison." Please correct in future plans.

- [Item 35] The information provided in your plan for the required number of PM_{10} monitoring sites required by 40 CFR 58 Appendix D is incorrect. The population threshold for MSAs requiring PM_{10} monitoring is 100,000. In your next plan, please note that there are no requirements per 40 CFR 58 Appendix D for PM_{10} monitoring in the Carson City MSA and also none required in Micropolitan Statistical Areas, such as Elko and Pahrump. Please correct the information in your next plan to evaluate the requirement for each area separately, and indicate that there are no sites required in Micropolitan Statistical Areas. Also, please note that the requirement for population is by MSA, not county.

  The description of other requirements such as for maintenance plans or MOUs are good information to continue to include in the plan, but was not the intent of evaluating the network requirements of 40 CFR 58 Appendix D.

- [Item 51] Minimum monitoring requirements for ozone described in 40 CFR 58 Appendix D apply only to Metropolitan Statistical Areas. Based on the population and design value, the Carson City MSA requires one ozone site. Please correct the information in your next plan to evaluate the requirement for each area separately, and indicate that there are no sites required in Micropolitan Statistical Areas. Also, please note that the requirement for population is by MSA, not county.

- [Item 60] No SO_2 monitors are required according to the plan as the PWEI is below the threshold. However, include the calculated PWEI in next year's plan.

- [Item 62] Correct the typo on the top of page 13 (Elko Site Description) for the 723 Railroad Street site from "32-007-003" to "32-007-0003".

- [Item 68] The Carson City site should make the following changes to better align with the correct terminology: change $PM_{2.5}$ "Max Concentration" to "Highest Concentration" and change O_3 "Max Concentration" to "Max O_3 Concentration

- [Item 83] Provide measurement of unrestricted airflow in degrees for the $PM_{2.5}$ monitor at Jarbidge Wilderness IMPROVE.

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

C. ANNUAL MONITORING NETWORK PLAN CHECKLIST

(Updated October 1, 2015)

Year: 2015
Agency: Nevada Division of Environmental Protection

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, PAMS stations, and SPM monitoring 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	Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]?	Does the information provided[3] meet the requirement?[4]	Notes
GENERAL PLAN REQUIREMENTS					
1.	Submit plan by July 1st	58.10 (a)(1)	Yes	Yes	Addendum for approval to discontinue CO monitor 32-005-0009-42101-1 at Stateline, NV received August 3, 2015.
2.	30-day public comment / inspection period[5]	58.10 (a)(1), 58.10 (a)(2)	Yes	Yes	NDEP did not receive any comments or questions from the public.
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, August 3, 2015 addendum	Insufficient to Judge	EPA will not be approving the following modifications as part of the 2015 ANP review: • Shutdown of Harvey CO SLAMS
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	
6.	Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal	58.10 (b)(5)	Yes Pg. 13-42	Yes	No proposals
7.	A plan for establishing a near-road $PM_{2.5}$ monitor (in CBSAs ≥ 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 CO monitor (in CBSAs ≥ 2.5 million) by 1/1/2015 **(plan was due July 1, 2014)**	58.10(a)(7) 58.13(e)(1)	NA	NA	

[1] Response options: NA (Not Applicable), Yes, No, Incomplete, Incorrect. The responses "Incomplete" and "Incorrect" assume that some information has been provided.
[2] To the best of our knowledge.
[3] Assuming the information is correct
[4] Response options: NA (Not Applicable) – [reason], Yes, No, Insufficient to Judge.
[5] 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	Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]?	Does the information provided[3] meet the requirement?[4]	Notes
9.	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	
10.	Precision/Accuracy reports submitted to AQS	58.16(a); App A, 1.3 and 5.1.1	Yes Pg. 3	Yes	
11.	Annual data certification submitted	58.15 App. A 1.3	Yes Pg. 3	Yes	
12.	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.[6]	58.11 (a) (2)	Yes Pg. 13-42	Yes	
13.	SPMs operating FRM/FEM/ARM monitors for over 24 months are listed as comparable to the NAAQS or the agency provided documentation that requirements from Appendices A, C, or E were not met.[7]	58.20(c)	Yes Pg. 13-42	Yes	
14.	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})					
15.	Designation of a primary monitor if there is more than one monitor for a pollutant at a site.	Need to determine collocation	No	Insufficient to Judge	The Carson City Armory site includes two $PM_{2.5}$ monitors, but no information is given to determine which monitor is primary.
16.	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 Pg. 13-42	Yes	

[6] 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.
[7] 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	Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]?	Does the information provided[3] meet the requirement?[4]	Notes
17.	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 Pg. 13-42	Yes	
18.	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	
$PM_{2.5}$ –SPECIFIC MONITORING REQUIREMENTS					
19.	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)	No	Insufficient to judge	This statement is not included in the plan as required
20.	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 required data assessment.) (Note 2: Required SLAMS must monitor $PM_{2.5}$ with NAAQS-comparable monitor at the required sample frequency.)	58.10 (b)(13) 58.11 (e)	NA	NA	

	ANP requirement	Citation within 40 CFR 58	Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]?	Does the information provided[3] meet the requirement?[4]	Notes
21.	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 Pg. 8	Yes	Minimum monitoring requirements for $PM_{2.5}$ only apply to Metropolitan Statistical Areas. Since Gardnerville Ranchos is a Micropolitan Statistical Area, there are no monitors currently required for this area by 40 CFR 58 Appendix D. Also, as a general note, SPMs do not count towards meeting minimum monitoring requirements. Also, please note that the requirement for population is by MSA, not county. The minimum monitoring requirements for $PM_{2.5}$ are specified in 40 CFR 58 Appendix D 4.7.1(a): "State, and where applicable local, agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in Table D-5 of this appendix." Please correct Table 2 to reflect the number of SLAMS sites, rather than monitors. According to information provided in the site tables, Table 2 should indicate that there is 1 active site in the Carson MSA and either remove the row for Gardnerville Ranchos or list 0 active sites, as the only monitor is not a SLAMS, but an SPM.
22.	Requirements for continuous $PM_{2.5}$ monitoring (number of monitors and collocation)	App D 4.7.2	Yes Pg. 22	Yes	Since there are 0-1 $PM_{2.5}$ SLAMS sites required for the Carson City MSA, 40 CFR Appendix D 4.7.2 requires 0-1 continuous monitor in the MSA.
23.	FRM/FEM/ARM $PM_{2.5}$ QA collocation	App A 3.2.5	Incomplete Pg. 13-42	Insufficient to Judge	This requirement cannot be judged since the plan does not specify which monitor is primary at Carson City Armory site. Please update this in ANP under "Detailed Site Information".
24.	$PM_{2.5}$ Chemical Speciation requirements for official STN sites	App D 4.7.4	NA	NA	
25.	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 Pg. 13-42	Yes	There is a row in the site called "suitable for $PM_{2.5}$ comparison", though this is likely the row asking for "suitable for annual $PM_{2.5}$ comparison". Please correct in future plans.
26.	Required $PM_{2.5}$ sites represent area-wide air quality	App D 4.7.1(b)	Yes Pg. 13-42	Yes	

	ANP requirement	Citation within 40 CFR 58	Was the information submitted?[1] If yes, page #s. Flag if incorrect[2]?	Does the information provided[3] meet the requirement?[4]	Notes
27.	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 Pg. 13-42	Yes	
28.	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	
29.	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	
30.	States must have at least one $PM_{2.5}$ regional background and one $PM_{2.5}$ regional transport site.	App D 4.7.3	Yes Pg. 13-42	Yes	The IMPROVE site at Jarbidge Wilderness fulfills this requirement.
31.	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	Incomplete	Insufficient to judge	Without the primary monitor specified at Carson City Armory, this requirement cannot be determined.
32.	Frequency of flow rate verification for manual $PM_{2.5}$ monitors audit	App A 3.3.2	Yes Pg. 13-42	Yes	
33.	Frequency of flow rate verification for automated $PM_{2.5}$ monitors audit	App A 3.2.3	Yes Pg. 13-42	Yes	
34.	Dates of two semi-annual flow rate audits conducted in **CY2014** for $PM_{2.5}$ monitors	App A, 3.2.4 and 3.3.3	Yes Pg. 13-42	Yes	

PM_{10} –SPECIFIC MONITORING REQUIREMENTS					
35.	Minimum # of monitoring sites for PM_{10}	App D, 4.6 (a) and Table D-4	Yes Pg. 8	Yes	The information provided in your plan for the required number of monitoring sites required by 40 CFR 58 Appendix D is incorrect. The population threshold for MSAs requiring PM_{10} monitoring is 100,000. In your next plan, please note that there are no requirements per 40 CFR 58 Appendix D for PM_{10} monitoring in the Carson City MSA and also none required in Micropolitan Statistical Areas, such as Elko and Pahrump. Please correct the information in your next plan to evaluate the requirement for each area separately, and indicate that there are no sites required in Micropolitan Statistical Areas. Also, please note that the requirement for population is by MSA, not county. The description of other requirements such as for maintenance plans or MOUs are good information to continue to include in the plan, but was not the intent of evaluating the network requirements of 40 CFR 58 Appendix D.
36.	Manual PM_{10} method collocation (note: continuous PM_{10} does not have this requirement)	App A 3.3.1	NA	NA	No manual PM_{10} methods
37.	Sampling schedule for PM_{10}	58.10 (b)(4) 58.12(e) App D 4.6	Yes Pg. 13-42	Yes	
38.	Frequency of flow rate verification for manual PM_{10} monitors audit	App A 3.3.2	Yes Pg. 13-42	Yes	
39.	Frequency of flow rate verification for automated PM_{10} monitors audit	App A 3.2.3	Yes Pg. 13-42	Yes	
40.	Dates of two semi-annual flow rate audits conducted in **CY2014** for PM_{10} monitors	App A, 3.2.4 and 3.3.3	Yes Pg. 13-42	Yes	
Pb –SPECIFIC MONITORING REQUIREMENTS					
41.	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 Pg. 6	Yes	No requirement
42.	Pb collocation: for non-NCore sites	App A 3.3.4.3	NA	NA	
43.	Any source-oriented Pb site for which a waiver has been granted by EPA Regional Administrator	58.10 (b)(10)	NA	NA	

44.	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	
45.	Designation of any Pb monitors as either source-oriented or non-source-oriented	58.10 (b)(9)	NA	NA	
46.	Sampling schedule for Pb	58.10 (b)(4) 58.12(b) App D 4.5	NA	NA	
47.	Frequency of flow rate verification for Pb monitors audit	App A 3.3.4.1	NA	NA	
48.	Dates of two semi-annual flow rate audits conducted in **CY2014** for Pb monitors	App A 3.3.4.1	NA	NA	
GENERAL GASEOUS MONITORING REQUIREMENTS					
49.	Frequency of one-point QC check (gaseous)	App. A 3.2.1	Yes Pg. 13-42	Yes	
50.	Date of Annual Performance Evaluation (gaseous) conducted in **CY2014**	App. A 3.2.2	Yes Pg. 13-42	Yes	
O_3 –SPECIFIC MONITORING REQUIREMENTS					
51.	Minimum # of monitoring sites for O_3 [Note: should be supported by MSA ID, MSA population, DV, # monitoring sites, and # required monitoring sites][8]	App D, 4.1(a) and Table D-2	Yes Pg. 8	Yes	Minimum monitoring requirements for ozone described in 40 CFR 58 Appendix D apply only to Metropolitan Statistical Areas. Based on the population and design value, the Carson City MSA requires one ozone site. Please correct the information in your next plan to evaluate the requirement for each area separately, and indicate that there are no sites required in Micropolitan Statistical Areas. Also, please note that the requirement for population is by MSA, not county.
52.	Identification of maximum concentration O_3 site(s)	App D 4.1 (b)	Yes Pg. 13-42	Yes	
53.	Sampling season for O_3 (Note: Waivers must be renewed annually. EPA expects agencies to submit re-evaluations of the relevant data each year with the ANP. EPA will then respond as part of the ANP response.)	58.10 (b)(4) App D, 4.1(i)	Yes Pg. 9, 13-42	Yes	All ozone monitors switched to year-round monitoring starting April 1, 2015

[8] Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements. In addition, ozone monitors that do not meet traffic count/distance requirements to be neighborhood or urban scale (40 CFR 58 Appendix E, Table E-1) cannot be counted towards minimum monitoring requirements.

NO_2 –SPECIFIC MONITORING REQUIREMENTS					
54.	Minimum monitoring requirement for single near-road NO_2 monitor (in CBSA $\geq$ 1 million) by 1/1/2014	58.13(c)(3) App D 4.3.2	NA	NA	
55.	Minimum monitoring requirement for second near-road NO_2 monitor (in CBSA $\geq$ 2.5 million) by 1/1/2015	58.13(c)(4) App D 4.3.2	NA	NA	
56.	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)	App D 4.3.3	NA	NA	
57.	Minimum monitoring requirements for susceptible and vulnerable populations monitoring (aka RA40) NO_2 (operation required by January 1, 2013)	App D 4.3.4	NA	NA	
58.	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					
59.	Minimum monitoring requirement for near-road CO monitor (in CBSA $\geq$ 2.5 million) by 1/1/2015	58.13(e)(1) App D 4.2.1	NA	NA	
SO_2 –SPECIFIC MONITORING REQUIREMENTS					
60.	Minimum monitoring requirements for SO_2 [Note: Only monitors considered to be required SLAMs are eligible to be counted towards meeting minimum monitoring requirements.]	App D 4.4	Yes Pg. 6, 8	Yes	No monitors are required according to the plan as the PWEI is below the threshold. However, include the calculated PWEI in next year's plan.

NCORE –SPECIFIC MONITORING REQUIREMENTS					
61.	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	NA	NA	
SITE OR MONITOR - SPECIFIC REQUIREMENTS (OFTEN INCLUDED IN DETAILED SITE INFORMATION TABLES)					
62.	AQS site identification number for each site	58.10 (b)(1)	Yes Pg. 13-42	Yes	Correct typo on the top of page 13 (Elko Site Description) for the 723 Railroad Street site from "32-007-003" to "32-007-0003".
63.	Location of each site: street address and geographic coordinates	58.10 (b)(2)	Yes Pg. 13-42	Yes	Add Jarbidge monitoring location to map.
64.	MSA, CBSA, CSA or other area represented by the monitor	58.10 (b)(8)	Yes Pg. 13-42	Yes	
65.	Parameter occurrence code for each monitor	Needed to determine if other requirements (e.g., min # and collocation) are met	Yes Pg. 13-42	Yes	
66.	Statement of purpose for each monitor	58.10 (a)(1)	Yes Pg. 3-4, 13-42	Yes	The statement of purpose for the $PM_{2.5}$ monitor at Jarbidge is stated on pages 3-4, but this information would be useful if also provided in the site table.

67.	Basic monitoring objective for each monitor	App D 1.1 58.10 (b)(6)	Yes Pg. 13-42	Incorrect in one instance	The basic monitoring objective for the $PM_{2.5}$ monitor at Jarbidge Wilderness IMPROVE is "Other", which is not an applicable monitoring objective. Appropriate monitoring objectives are: (a) Provide air pollution data to public in a timely manner (b) NAAQS comparison (c) Research support
68.	Site type for each monitor	App D 1.1.1	Yes Pg. 13-42	Yes	The Carson City site should make the following changes to better align with the correct terminology: • $PM_{2.5}$. – Change "Max Concentration" to "Highest Concentration" • O_3 – Change "Max Concentration" to "Max O_3 Concentration
69.	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 Pg. 13-42	Incorrect in one stance	IMPROVE is not a monitor type, but is the Network Affiliation for the $PM_{2.5}$ Jarbidge monitor. Appropriate monitor types are: • SLAMS • Special Purpose • Industrial • Non-EPA Federal • Tribal • EPA • Other
70.	Scale of representativeness for each monitor as defined in Appendix D	58.10(b)(6); App D	Yes Pg. 13-42	Incorrect in one instance	The Linda Street PM_{10} monitor is listed as an Urban scale site, however, the distance to roadway and AADT do not meeting the criteria for Urban scale (20m, 22,000 AADT)
71.	Parameter code for each monitor	Needed to determine if other requirements (e.g., min # and collocation) are met	Yes Pg. 13-42	Incorrect in one instance	The $PM_{2.5}$ monitor at Jarbidge is listed as a non-FRM/FEM/ARM (IMPROVE Sampler Version II). If this information is correct, then the parameter code for $PM_{2.5}$ at this site should not be 88501, not 88101.
72.	Method code and description (e.g., manufacturer & model) for each monitor	58.10 (b)(3); App C 2.4.1.2	Yes Pg. 13-42	Yes	

73.	Sampling start date for each monitor	Needed to determine if other requirements (e.g., min # and collocation) are met	Yes Pg. 13-42	Yes	
74.	Distance of monitor from nearest road	App E 6	Yes Pg. 13-42	No	Distance to roadway and AADT do not match the spatial scale for Linda Street PM_{10} (Urban scale, 20m to road, 22,000 AADT).
75.	Traffic count of nearest road	App E	Yes Pg. 13-42	No	Distance to roadway and AADT do not match the spatial scale for Linda Street PM_{10} (Urban scale, 20m to road, 22,000 AADT). The traffic count for Jarbidge Wilderness IMPROVE $PM_{2.5}$ monitor is listed as "NA". Please clarify if that is intending to state that it is negligible.
76.	Groundcover	App E 3(a)	Yes Pg. 13-42	Yes	
77.	Probe height	App E 2	Yes Pg. 13-42	Yes	
78.	Distance from supporting structure	App E 2	Yes Pg. 13-42	Insufficient to judge	The following monitors may not be meeting the requirement: • Elko – PM_{10} (1.2m) • Carson City Armory – $PM_{2.5}$ (1.5m, 1.5m) • Manse Elementary – PM_{10} (>1m) • Glen Oaks – PM_{10} (>1m)
79.	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 Pg. 13-42	Yes	
80.	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)	Incomplete Pg. 13-42	Insufficient to judge	Provide vertical heights of obstructions above the probe (and tree height above the probe as trees can act as obstructions) at all sites.
81.	Distance from the drip line of closest tree(s)	App E 5	Yes Pg. 13-42	Yes	
82.	Distance to furnace or incinerator flue	App E 3(b)	Yes Pg. 13-42	Yes	
83.	Unrestricted airflow (expressed as degrees around probe/inlet or percentage of monitoring path)	App E, 4(a) and 4(b)	Yes Pg. 13-42	Yes	In next year's ANP, please provide measurement of unrestricted airflow in degrees for the $PM_{2.5}$ monitor at Jarbidge Wilderness IMPROVE
84.	Probe material ($NO/NO_2/NO_y$, SO_2, O_3; For PAMS: VOCs, Carbonyls)	App E 9	Yes Pg. 13-42	Yes	

85.	Residence time ($NO/NO_2/NO_y$, SO_2, O_3; For PAMS: VOCs, Carbonyls)	App E 9	Yes Pg. 13-42	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? Yes
    - If yes, was the response adequate?
- Do the substantive comments require separate EPA response (i.e., agency response wasn't adequate)?

APPENDIX B

NDEP BAQP 2015 Data Certification Letter

NEVADA DIVISION OF
ENVIRONMENTAL PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
David Emme, Administrator

April 8, 2016

Mr. Jared Blumenfeld
Regional Administrator
U.S. EPA – Region 9
75 Hawthorne Street, Ste. 11
San Francisco, CA 94105

RE: Submittal of the State of Nevada 2015 Data Certification Package

Dear Mr. Blumenfeld:

Pursuant to 40 CFR Part 58, state and local government monitoring organizations must annually certify their data. Certification for the year 2015 means that (1) the ambient concentration data and the quality assurance data from January 1, 2015 through December 31, 2015 are completely submitted to the Air Quality System (AQS) by the State of Nevada, Primary Quality Assurance Organization (PQAO) 0757, and (2) the ambient data are accurate to the best of my knowledge taking into consideration the quality assurance findings. This process has taken into account the results of periodic verification, precision and accuracy checks, and any other relevant performance assessments.

Therefore, as Chief of the Bureau of Air Quality Planning for the State of Nevada, I certify that all data from the NDEP State and Local Air Monitoring System (SLAMS) and the Special Purpose Monitor (SPM) reported to EPA Region 9, enclosed on the AMP 600 summary report, have met the data certification criteria described in 40 CFR Part 58, for the year 2015.

If you have any questions or comments, please contact Daren Winkelman of my staff, at 775-687-9342, or e: dwinkelman@ndep.nv.gov.

Sincerely,

Danilo Dragoni, Chief
Bureau of Air Quality Planning

DD/dw
Enclosure

APPENDIX C

Sample Public Notifications

August 21, 2015

Haze and areas of smoke affect Fallon

Smoke will fill the air over western Nevada through Sunday. This is due to the smoke coming from the fires in Northern California and Washington State. The National Weather Service forecasts clearer skies in the afternoons.

Those with respiratory problems are advised to stay inside as much as possible. The NWS said the current haze should last until Sunday, but conditions can change.

The NWS weekend forecast:

Today

Widespread haze. Areas of smoke before 11am. Sunny, with a high near 95. West wind 5 to 10 mph.

Tonight

Widespread haze. Areas of smoke after 11pm. Clear, with a low around 52. West wind 5 to 15 mph.

Saturday

Widespread haze. Sunny, with a high near 96. West wind around 5 mph becoming northeast in the morning.

Saturday Night

Widespread haze before 11pm. Mostly clear, with a low around 54. North wind around 5 mph

Sunday

Sunny, with a high near 96. Southwest wind around 5 mph.

Sunday Nigh

tPartly cloudy, with a low around 57.

Nevada Appeal staff report

August 22, 2015

Smoke, haze on tap, but may ease a tad

Smoke from California wildfires cover the mountains above as people enjoy Hopefest at the Carson-Tahoe Career Resource Center Friday night. For more photos, see page A4.

Smoke is seen over the valley in the distance from numerous California wildfires Friday evening in Carson City.

Carson-Tahoe Health medical complex in north Carson City.

Smoke blew into the Carson City area and is seen in the distance beyond Carson-Tahoe Medical Center Hospital Friday evening. Several northern California wildfires have created the haze over a large portion of northern Nevada.

Smoke gets in your eyes is more than a song title in Carson City and the region this weekend.

"Smoke and haze has persisted through the overnight hours generally from Truckee-Carson City-Fallon northward to the Oregon border," the National Weather Service in Reno reported about the northern California and northwestern Nevada region Friday. The area forecast discussion for the weekend didn't provide significant room for a change in the smoke situation from western wildfires, though small improvement prospects weren't branded impossible.

It said, however, today looks to be hazy still.

An active rough fire in Kings Canyon National Park may spread California/Nevada smoke across southern Mono and Mineral counties this afternoon, said the Reno weather service area discussion, "with distant haze visible south and east of the Reno-Tahoe vicinity." It reported no major flareups from the Walker fire near Mono Lake, "which has been less active for the past couple of days."

Jim Wallmann in the Reno office confirmed that, saying smoky conditions in northwestern Nevada coming more from wildfires to the west rather than southwest were Friday's problem. He said there may be "a little bit of improvement" today compared with Friday afternoon as wind direction shifts, while "Sunday looks like the best day" as wind direction changes again.

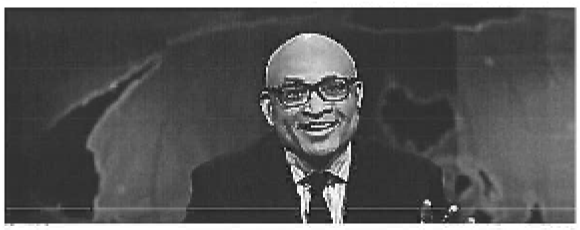
"This smoke is all from the fire west of Redding," he said Friday.

Results of the haze mean visibility has been poor and conditions have brought warnings air quality is unhealthy for sensitive groups.

"Air quality may improve this afternoon with increased westerly winds and better mixing," the area forecast discussion reported, "but new smoke will likely push into the region again as wildfires continue to burn in California, Oregon, Washington, Idaho and Montana."

Top Video Headlines

of 3



Thursday, August 20, 2015

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1815Z August 20, 2015

SMOKE:
Western and Central US/Southwest and South Central Canada:
Large areas of smoke ranging from light to heavy density are visible over a majority of the western US as well as far southwest and south central Canada . The heaviest smoke is visible over northeast Washington, north Idaho, west Montana, southeast British Columbia, and southwest Alberta this morning. Moderate density smoke is observed farther east and southeast across much of Montana, Wyoming, south Idaho, north Utah, northwest and northeast Colorado, western Nebraska, and northwest Kansas. Most of this smoke comes from the extreme amount of wildfires burning in Washington, Oregon, Idaho, and northwest Montana. Some elevated dust may have mixed with the smoke. Additional moderately dense smoke exists over southeast Oregon, northwest Nevada, and northern California as large wildfires in northwest California continue to produce significant smoke. Light to moderate smoke from fires in the California's Sierra Nevada range is seen over east central California, west and southern Nevada, and western Arizona. Light density smoke from all of these fires extends to the central US and as far south/east as Iowa, Missouri, and Arkansas.

Midwest:
A ribbon of smoke is seen dipping down from along the Manitoba/Ontario border covering much of Minnesota, eastern Iowa, southwest Wisconsin, northern Illinois, and northwest Indiana. This smoke is obscured along the western/southwestern edge of the upper low over the western Great Lakes but is thought to be of Asian origin, possibly from fires burning in Siberia.

Southeast Canada/Northeast US:
Areas of residual light smoke are seen over the Gulf of St. Lawrence and across parts of Newfoundland. This smoke likely originates from the wildfires in the Pacific Northwest. Additional aerosol seen off the coast of the Northeast US and over far eastern Massachusetts could still be residual smoke but there is also a possibility that the aerosol is now mostly composed of sulfates.

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

Thursday, August 20, 2015

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 0200Z August 21, 2015

SMOKE:

Numerous large wildfires burning in California, Oregon, Washington, Idaho, and Montana are collectively responsible for blanketing the majority of the western United States in light density (at minimum) remnant smoke. Moderate density smoke is observed in northern California moving east into western Nevada, and also from eastern Washington State and Oregon southeast as far as the Nebraska â€" Iowa border. Heavy smoke is limited to northern California, northeast Washington, and much of Montana.

From Earlier....
Midwest:
A ribbon of smoke is seen dipping down from along the Manitoba/Ontario border covering much of Minnesota, eastern Iowa, southwest Wisconsin, northern Illinois, and northwest Indiana. This smoke is obscured along the western/southwestern edge of the upper low over the western Great Lakes but is thought to be of Asian origin, possibly from fires burning in Siberia.

Southeast Canada/Northeast US:
Areas of residual light smoke are seen over the Gulf of St. Lawrence and across parts of Newfoundland. This smoke likely originates from the wildfires in the Pacific Northwest. Additional aerosol seen off the coast of the Northeast US and over far eastern Massachusetts could still be residual smoke but there is also a possibility that the aerosol is now mostly composed of sulfates.

BLOWING DUST:
A small area of blowing dust was observed in Arizona using visible satellite imagery this evening. The dust originated on the western border of Yavapai County and Maricopa country, and moved southwest between 2200Z and sunset (0145Z). The dust reached the eastern portion of Maricopa County.

Ramirez/Sheffler

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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

Friday, August 21, 2015

DESCRIPTIVE TEXT NARRATIVE FOR SMOKE/DUST OBSERVED IN SATELLITE IMAGERY
THROUGH 1700Z August 21, 2015

SMOKE:
Western/Central US and Canada:
A large area of light to heavy density of smoke is visible extending across the country this morning, originating from the wildfires currently burning in British Columbia, Washington, Idaho, Montana, Oregon, and California. The heaviest area of smoke is located in in North and South Dakota, Wyoming, Minnesota, and Wisconsin, moving eastward. Medium density smoke is visible extending eastward from California to Wisconsin, with a separate plume moving into Nevada and Arizona from the â€œRoughâ€ wildfire complex located in Fresno County, California. Light to medium density smoke is visible detaching and moving east off into Alberta, southern Manitoba and Ontario. Due to the visual limitations of GOES-W, it is difficult to determine the extent of the smoke moving east, but the plume is making its way east beyond Indiana and as far south as Arkansas.

Eastern US/Canada:
A few detached plumes of remnant smoke is visible moving NE off of Quebec and Nunavut (NW Passages). A separate plume in the Atlantic Ocean to the south is visible moving west towards Nova Scotia. This smoke is remnant and originates from the numerous wildfires that have been burning in the western US and SW Canada.

Oegerle

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KML: http://www.ssd.noaa.gov/PS/FIRE/kml.html
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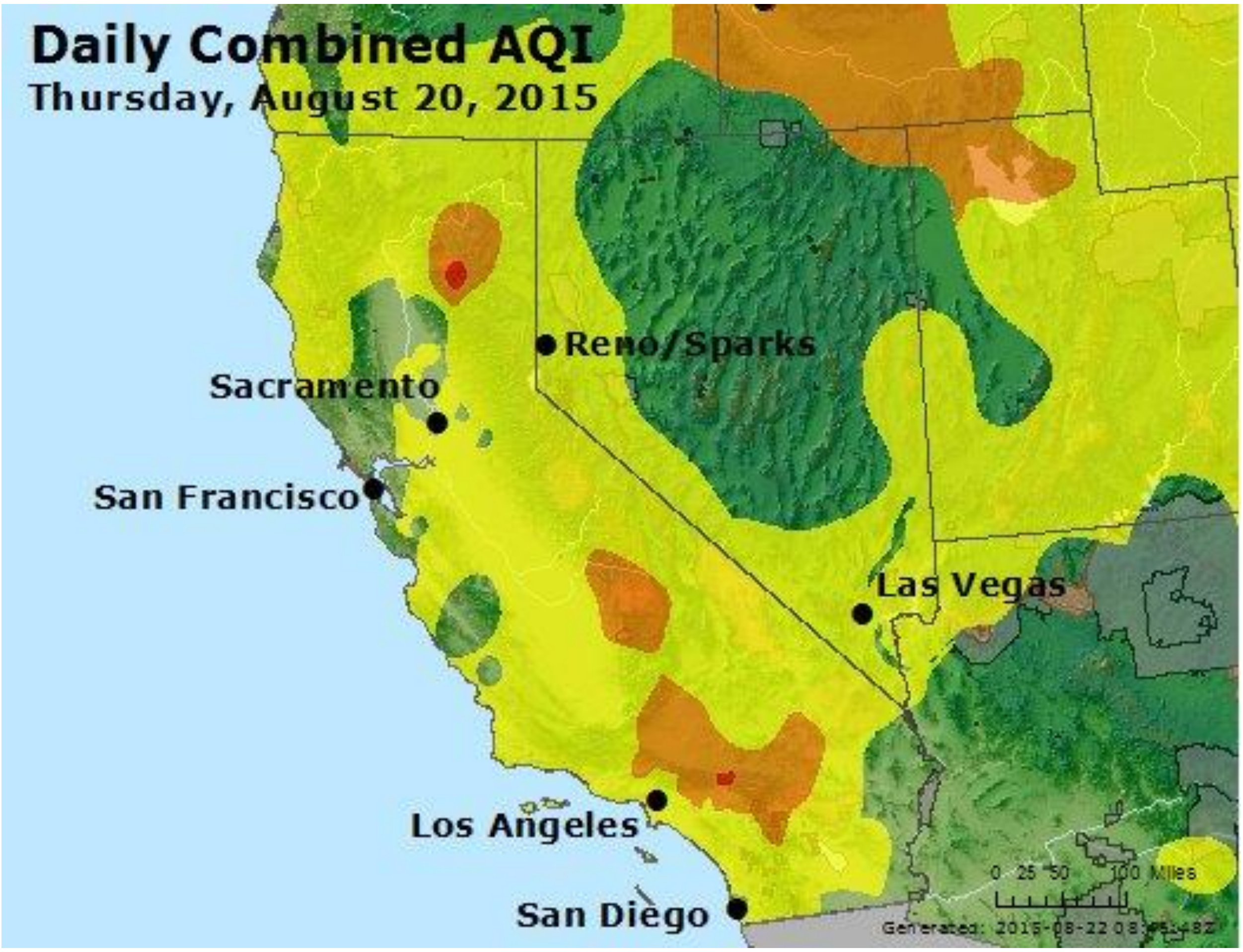
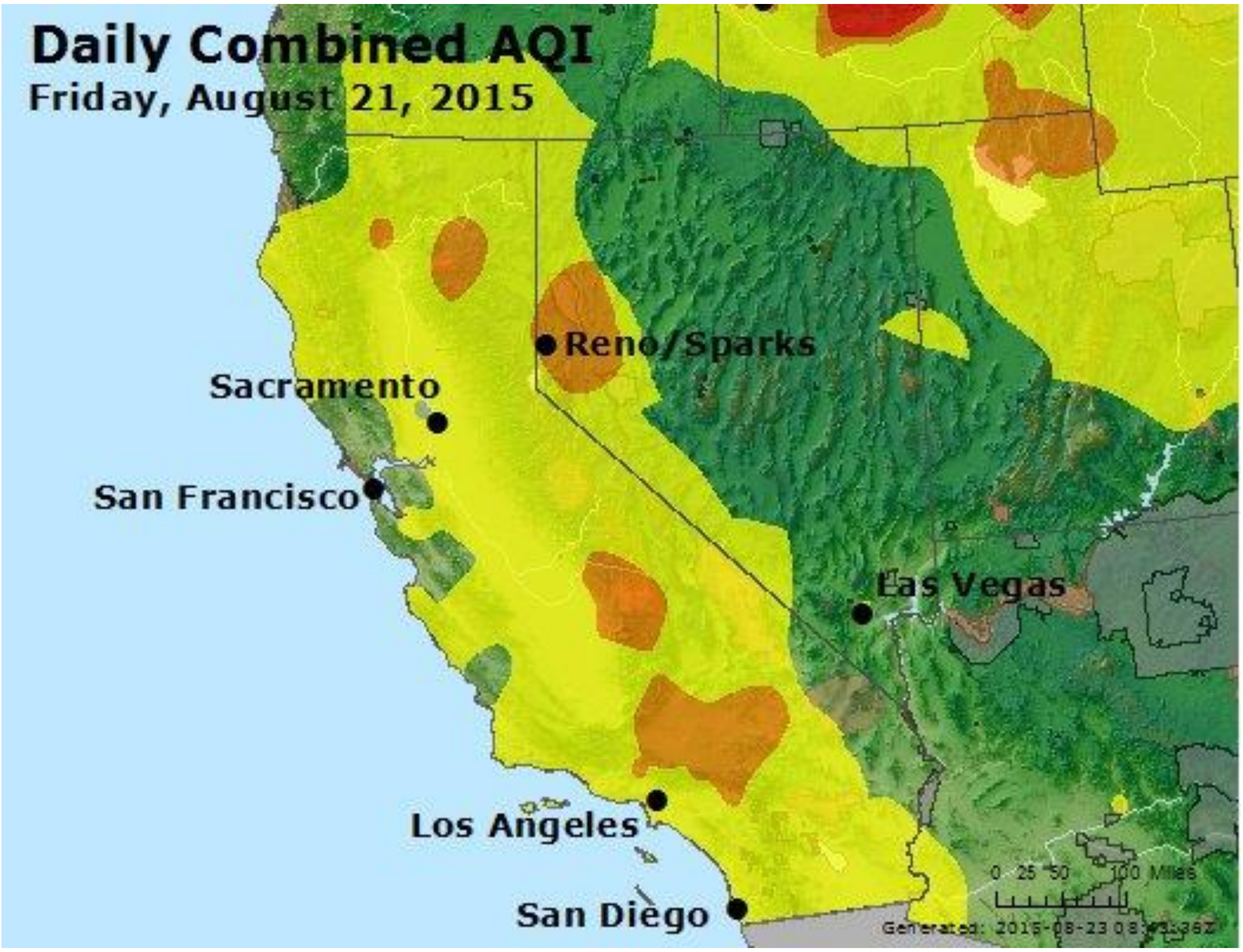


Peak AQI values for August 20, 2015.

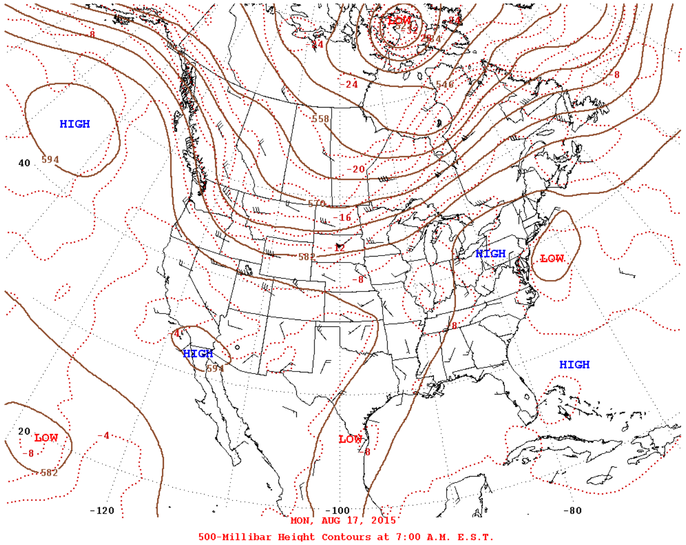


Peak AQI values for August 21, 2015.

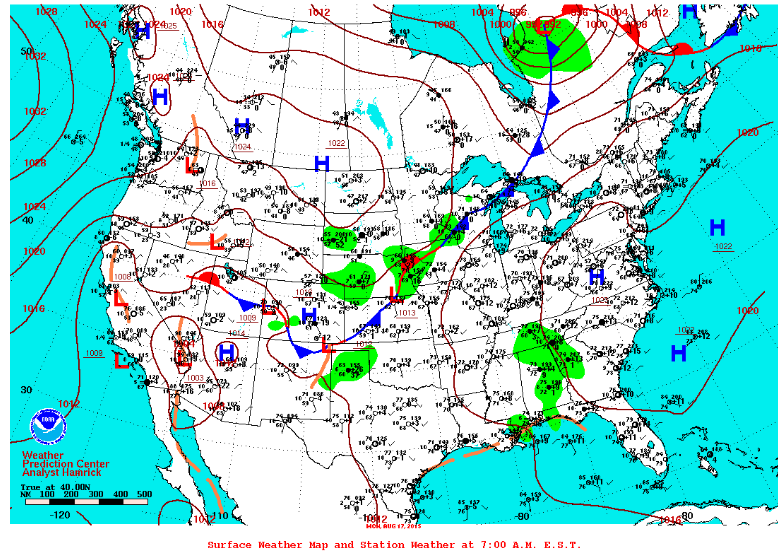
APPENDIX D

Surface and Upper Air Weather Maps for the Fallon Area – August 20 and 21, 2015

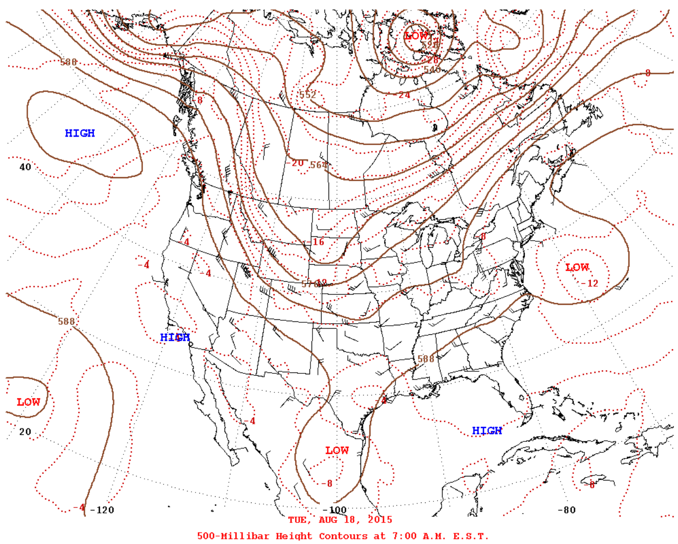
500mb weather map for August 17, 2015



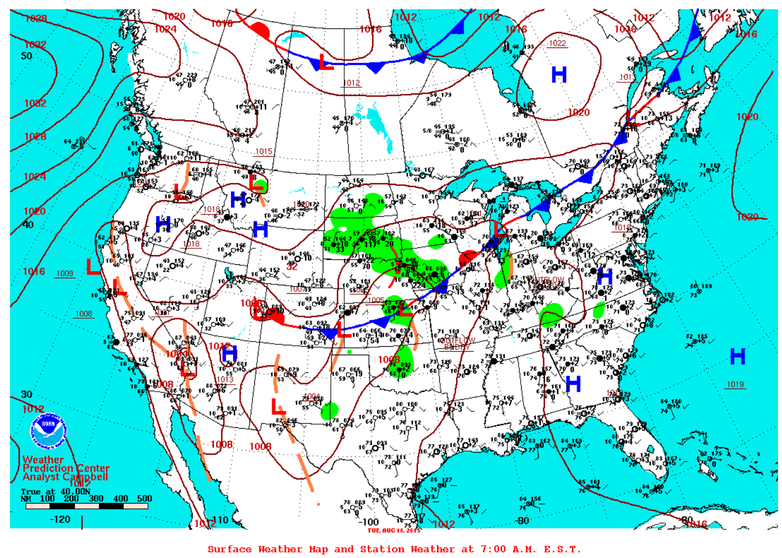
Surface Weather map for August 17, 2015

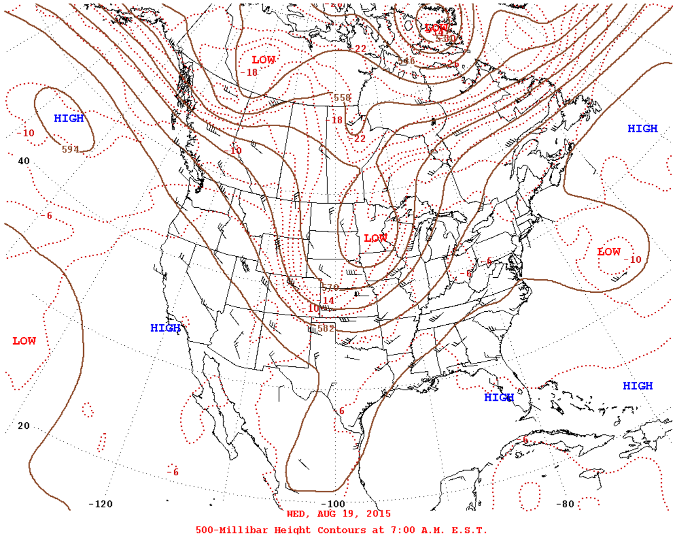
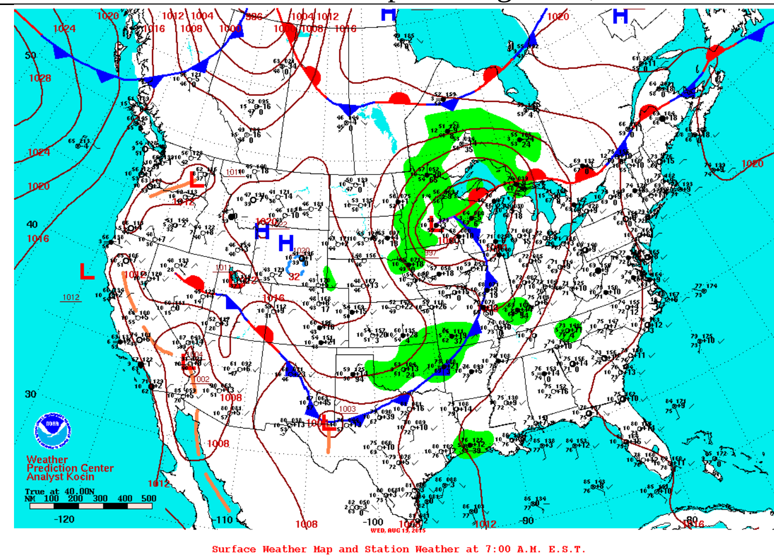
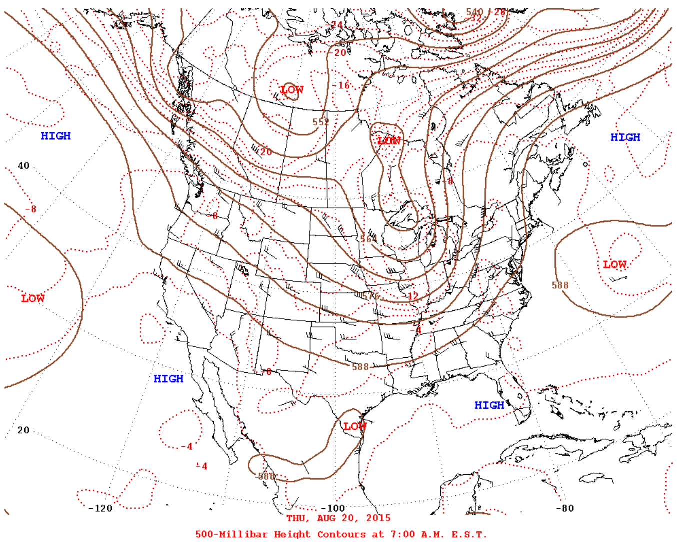
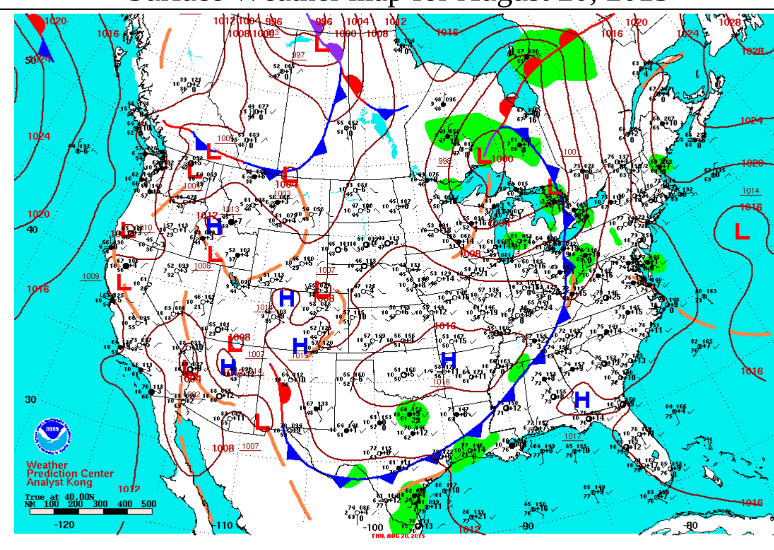


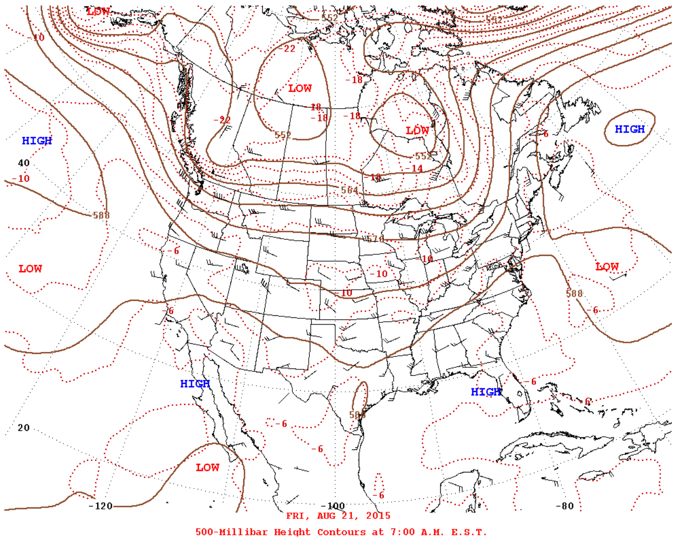
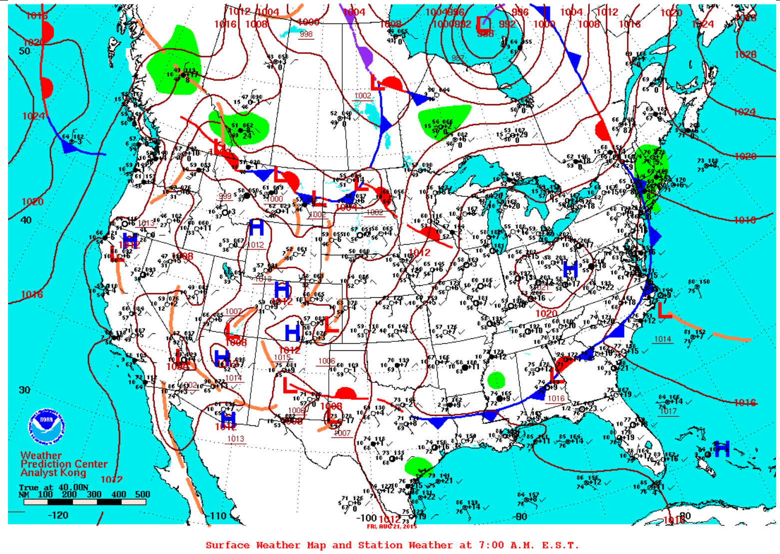
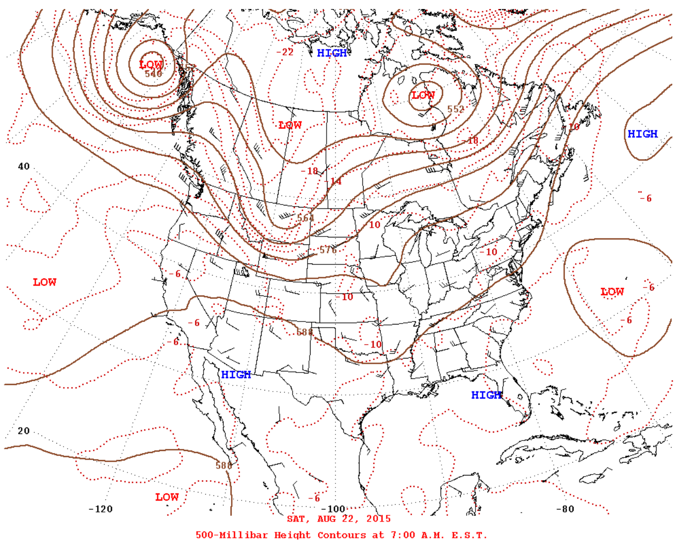
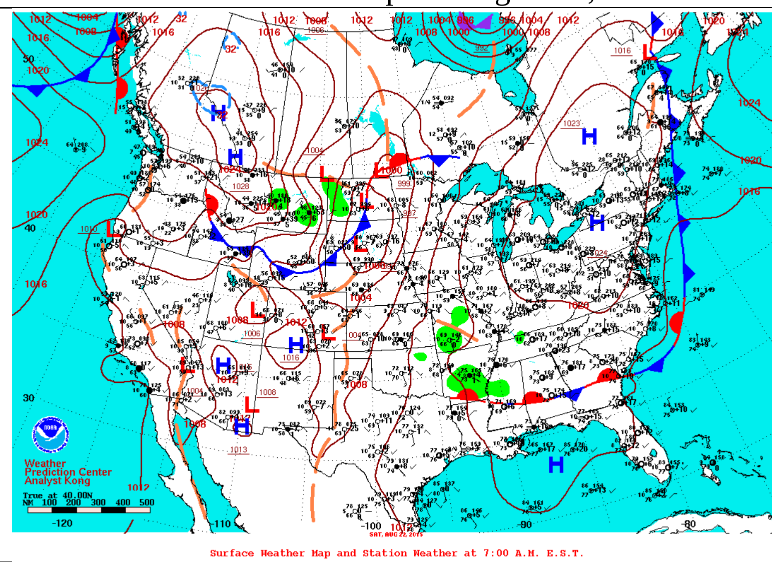
500mb weather map for August 18, 2015



Surface Weather map for August 18, 2015



500mb weather map for August 19, 2015	Surface Weather map for August 19, 2015
	
500mb weather map for August 20, 2015	Surface Weather map for August 20, 2015
	
500mb weather map for August 21, 2015	Surface Weather map for August 21, 2015

	
500mb weather map for August 22, 2015	Surface Weather map for August 22, 2015
	

Source: http://www.wpc.ncep.noaa.gov/dailywxmap/

Hourly Weather History from Fallon Naval Air Station – August 17 through 22, 2015

August 17, 2015

Time (PDT)	Temperature (°F)	Dew Point (°F)	Humidity (%)	Pressure (in Hg)	Visibility (miles)	Wind Direction	Wind Speed (mph)	Gust Speed (mph)	Precipitation (inches)	Conditions
12:56 AM	64.0	27.0	25	29.94	10.0	SSE	8.1	-	N/A	Clear
1:56 AM	66.0	25.0	21	29.94	10.0	SSE	6.9	-	N/A	Clear
2:56 AM	64.0	27.0	25	29.94	10.0	SSE	6.9	-	N/A	Clear
3:56 AM	66.0	27.0	23	29.95	10.0	SSE	3.5	-	N/A	Clear
4:56 AM	64.0	26.1	24	29.94	10.0	SSE	8.1	-	N/A	Clear
5:56 AM	60.1	28.0	30	29.95	10.0	Calm	Calm	-	N/A	Clear
6:21 AM	60.1	28.0	30	30.05	10.0	WSW	5.8	-	N/A	Scattered Clouds
6:56 AM	62.1	28.0	28	29.96	10.0	SSW	5.8	-	N/A	Scattered Clouds
7:56 AM	71.1	27.0	19	29.98	10.0	Calm	Calm	-	N/A	Scattered Clouds
8:56 AM	75.9	25.0	15	29.99	10.0	North	4.6	-	N/A	Scattered Clouds
9:56 AM	82.0	25.0	12	29.99	10.0	NW	3.5	-	N/A	Scattered Clouds
10:56 AM	86.0	25.0	11	29.99	10.0	North	6.9	-	N/A	Scattered Clouds
11:56 AM	91.0	23.0	8	29.98	10.0	NNE	5.8	-	N/A	Scattered Clouds
12:56 PM	91.0	18.0	7	29.96	10.0	Variable	3.5	-	N/A	Scattered Clouds
1:56 PM	93.9	15.1	6	29.94	10.0	Variable	3.5	-	N/A	Scattered Clouds
2:56 PM	93.9	15.1	6	29.92	10.0	North	-	-	N/A	Partly Cloudy
3:56 PM	98.1	12.9	4	29.90	10.0	Variable	5.8	-	N/A	Scattered Clouds
4:56 PM	97.0	14.0	5	29.89	10.0	North	8.1	-	N/A	Scattered Clouds
5:56 PM	97.0	14.0	5	29.88	10.0	ENE	8.1	-	N/A	Scattered Clouds
6:56 PM	95.0	16.0	6	29.87	10.0	NNE	5.8	-	N/A	Scattered Clouds
7:56 PM	82.9	17.1	9	29.88	10.0	North	5.8	-	N/A	Scattered Clouds
8:56 PM	75.0	21.0	13	29.90	10.0	NNE	8.1	-	N/A	Partly Cloudy
9:56 PM	73.0	19.9	14	29.92	10.0	Calm	Calm	-	N/A	Clear
10:56 PM	66.0	25.0	21	29.93	10.0	West	8.1	-	N/A	Clear
11:56 PM	68.0	19.9	16	29.93	10.0	West	6.9	-	N/A	Clear

Source: https://www.wunderground.com/history/

August 18, 2015

Time (PDT)	Temperature (°F)	Dew Point (°F)	Humidity (%)	Pressure (in Hg)	Visibility (miles)	Wind Direction	Wind Speed (mph)	Gust Speed (mph)	Precipitation (inches)	Conditions
12:56 AM	60.1	19.9	21	29.94	10.0	ESE	6.9	-	N/A	Clear
1:56 AM	60.1	19.0	20	29.95	10.0	ESE	5.8	-	N/A	Clear
2:56 AM	62.1	21.0	21	29.95	10.0	SW	4.6	-	N/A	Clear
3:56 AM	57.9	21.9	25	29.96	10.0	South	3.5	-	N/A	Clear
4:56 AM	53.1	23.0	31	29.96	10.0	South	3.5	-	N/A	Clear
5:56 AM	55.9	23.0	28	29.98	10.0	South	4.6	-	N/A	Clear
6:56 AM	54.0	25.0	33	29.99	10.0	Calm	Calm	-	N/A	Partly Cloudy
7:56 AM	66.9	27.0	22	30.00	7.0	SSE	3.5	-	N/A	Partly Cloudy
8:56 AM	73.9	26.1	17	30.00	8.0	Calm	Calm	-	N/A	Partly Cloudy
9:56 AM	80.1	24.1	13	30.00	8.0	WNW	5.8	-	N/A	Partly Cloudy
10:56 AM	87.1	21.9	9	29.99	8.0	North	6.9	-	N/A	Partly Cloudy
11:56 AM	91.0	21.0	8	29.98	9.0	North	6.9	-	N/A	Partly Cloudy
12:56 PM	91.0	21.0	8	29.96	9.0	Variable	4.6	-	N/A	Partly Cloudy
1:56 PM	93.9	19.9	7	29.95	10.0	North	8.1	-	N/A	Partly Cloudy
2:56 PM	96.1	19.0	6	29.93	10.0	NNW	11.5	-	N/A	Partly Cloudy
3:56 PM	96.1	18.0	6	29.91	10.0	WNW	6.9	-	N/A	Partly Cloudy
4:56 PM	97.0	18.0	6	29.89	8.0	NE	9.2	-	N/A	Scattered Clouds
5:56 PM	96.1	18.0	6	29.88	9.0	Variable	4.6	-	N/A	Scattered Clouds
6:56 PM	93.0	19.0	7	29.88	10.0	East	5.8	-	N/A	Scattered Clouds
7:56 PM	84.9	21.0	10	29.88	10.0	East	4.6	-	N/A	Scattered Clouds
8:56 PM	79.0	27.0	15	29.89	10.0	Calm	Calm	-	N/A	Scattered Clouds
9:56 PM	73.9	27.0	18	29.90	10.0	SW	4.6	-	N/A	Partly Cloudy
10:56 PM	70.0	28.0	21	29.90	10.0	WSW	3.5	-	N/A	Clear
11:56 PM	64.0	28.0	26	29.91	10.0	SSE	5.8	-	N/A	Clear

Source: https://www.wunderground.com/history/

August 19, 2015

Time (PDT)	Temperature (°F)	Dew Point (°F)	Humidity (%)	Pressure (in Hg)	Visibility (miles)	Wind Direction	Wind Speed (mph)	Gust Speed (mph)	Precipitation (inches)	Conditions
12:56 AM	64.9	25.0	22	29.91	10.0	SSW	4.6	-	N/A	Clear
1:56 AM	63.0	24.1	23	29.91	10.0	Calm	Calm	-	N/A	Clear
2:56 AM	63.0	25.0	24	29.91	10.0	SSE	4.6	-	N/A	Clear
3:56 AM	60.1	27.0	28	29.91	10.0	South	4.6	-	N/A	Clear
4:56 AM	60.1	26.1	27	29.92	10.0	SE	5.8	-	N/A	Clear
5:56 AM	60.1	28.0	30	29.94	10.0	Calm	Calm	-	N/A	Clear
6:07 AM	59.0	28.0	31	30.02	10.0	Calm	Calm	-	N/A	Mostly Cloudy
6:56 AM	61.0	28.9	30	29.95	9.0	SW	3.5	-	N/A	Mostly Cloudy
7:56 AM	68.0	32.0	26	29.96	9.0	South	4.6	-	N/A	Mostly Cloudy
8:56 AM	75.9	33.1	21	29.96	9.0	Calm	Calm	-	N/A	Mostly Cloudy
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10:56 AM	86.0	26.1	11	29.94	7.0	Calm	Calm	-	N/A	Mostly Cloudy
11:56 AM	89.1	25.0	10	29.93	7.0	WNW	6.9	-	N/A	Mostly Cloudy
12:56 PM	93.0	25.0	9	29.91	7.0	Variable	4.6	-	N/A	Mostly Cloudy
1:56 PM	96.1	24.1	8	29.89	7.0	NE	8.1	-	N/A	Mostly Cloudy
2:56 PM	97.0	25.0	8	29.88	7.0	NNE	4.6	-	N/A	Mostly Cloudy
3:56 PM	96.1	21.9	7	29.86	8.0	Variable	4.6	-	N/A	Mostly Cloudy
4:56 PM	97.0	21.9	7	29.84	8.0	East	5.8	-	N/A	Mostly Cloudy
5:56 PM	96.1	21.9	7	29.83	8.0	ENE	9.2	-	N/A	Mostly Cloudy
6:56 PM	93.9	23.0	8	29.82	8.0	NE	6.9	-	N/A	Mostly Cloudy
7:56 PM	86.0	28.0	12	29.83	10.0	NE	3.5	-	N/A	Mostly Cloudy
8:56 PM	84.9	21.0	10	29.85	10.0	WNW	3.5	-	N/A	Scattered Clouds
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Source: https://www.wunderground.com/history/

August 20, 2015

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2:56 AM	64.9	24.1	21	29.88	10.0	South	3.5	-	N/A	Partly Cloudy
3:56 AM	63.0	25.0	24	29.88	10.0	SSW	4.6	-	N/A	Partly Cloudy
4:56 AM	63.0	25.0	24	29.88	10.0	WSW	6.9	-	N/A	Mostly Cloudy
5:56 AM	57.9	26.1	30	29.88	10.0	South	4.6	-	N/A	Scattered Clouds
6:20 AM	57.2	24.8	29	29.97	10.0	SSE	9.2	-	N/A	Overcast
6:56 AM	62.1	24.1	23	29.89	10.0	South	8.1	-	N/A	Mostly Cloudy
7:56 AM	68.0	25.0	20	29.91	10.0	South	5.8	-	N/A	Scattered Clouds
8:56 AM	75.9	23.0	14	29.91	10.0	SSW	8.1	-	N/A	Scattered Clouds
9:56 AM	82.0	28.9	14	29.91	7.0	West	6.9	-	N/A	Scattered Clouds
10:56 AM	84.9	32.0	15	29.91	5.0	Calm	Calm	-	N/A	Smoke
11:56 AM	89.1	33.1	14	29.89	5.0	Variable	3.5	-	N/A	Smoke
12:56 PM	91.0	33.1	13	29.87	4.0	Variable	3.5	-	N/A	Smoke
1:56 PM	93.9	27.0	9	29.85	4.0	NNW	9.2	-	N/A	Smoke
2:56 PM	97.0	19.9	6	29.83	4.0	Variable	5.8	-	N/A	Smoke
3:56 PM	96.1	15.1	5	29.81	4.0	Variable	4.6	-	N/A	Smoke
4:56 PM	98.1	19.0	6	29.80	5.0	NW	9.2	-	N/A	Smoke
5:56 PM	97.0	19.0	6	29.79	5.0	NNE	8.1	-	N/A	Smoke
6:56 PM	93.9	16.0	6	29.78	6.0	North	5.8	-	N/A	Haze
7:56 PM	82.0	25.0	12	29.78	8.0	North	6.9	-	N/A	Partly Cloudy
8:56 PM	75.9	26.1	16	29.80	10.0	NW	8.1	-	N/A	Partly Cloudy
9:56 PM	77.0	26.1	15	29.82	7.0	WNW	8.1	-	N/A	Mostly Cloudy
10:56 PM	79.0	28.9	16	29.82	5.0	WNW	10.4	-	N/A	Haze
11:56 PM	66.9	28.9	24	29.83	5.0	South	5.8	-	N/A	Haze

Source: https://www.wunderground.com/history/

August 21, 2015

Time (PDT)	Temperature (°F)	Dew Point (°F)	Humidity (%)	Pressure (in Hg)	Visibility (miles)	Wind Direction	Wind Speed (mph)	Gust Speed (mph)	Precipitation (inches)	Conditions
12:56 AM	66.0	28.9	25	29.84	5.0	Calm	Calm	-	N/A	Haze
1:56 AM	66.9	28.9	24	29.85	4.0	South	6.9	-	N/A	Haze
2:56 AM	64.0	30.0	28	29.84	4.0	SSW	3.5	-	N/A	Haze
3:56 AM	57.9	28.9	33	29.85	4.0	South	3.5	-	N/A	Haze
4:56 AM	55.9	28.0	34	29.84	4.0	South	5.8	-	N/A	Haze
5:56 AM	59.0	27.0	29	29.85	5.0	SSE	8.1	-	N/A	Haze
6:16 AM	60.8	26.6	27	29.93	5.0	SSE	4.6	-	N/A	Smoke
6:56 AM	59.0	26.6	29	29.86	4.0	South	8.1	-	N/A	Smoke
7:56 AM	66.2	28.4	24	29.88	4.0	South	3.5	-	N/A	Smoke
8:56 AM	73.0	30.9	21	29.88	4.0	Calm	Calm	-	N/A	Smoke
9:56 AM	78.8	35.6	21	29.89	3.0	NW	3.5	-	N/A	Smoke
10:22 AM	80.6	35.6	20	29.97	3.0	Calm	Calm	-	N/A	Smoke
10:56 AM	84.0	35.1	17	29.89	2.0	Variable	4.6	-	N/A	Smoke
11:22 AM	84.9	34.0	16	29.96	2.0	NW	8.1	-	N/A	Smoke
11:56 AM	86.0	32.0	14	29.88	2.0	North	4.6	-	N/A	Smoke
12:56 PM	87.8	26.6	11	29.86	2.0	West	9.2	-	N/A	Smoke
1:56 PM	91.4	26.6	10	29.84	2.0	Variable	6.9	-	N/A	Smoke
2:56 PM	91.4	24.8	9	29.83	2.0	WSW	10.4	-	N/A	Smoke
3:56 PM	93.2	21.2	7	29.80	2.0	Variable	6.9	-	N/A	Smoke
4:56 PM	93.2	17.6	6	29.79	2.5	NW	6.9	-	N/A	Smoke
5:03 PM	93.2	17.6	6	29.86	2.5	NNE	6.9	-	N/A	Smoke
5:54 PM	91.4	21.2	8	29.86	3.0	NNE	6.9	-	N/A	Smoke
5:56 PM	91.4	19.4	7	29.79	3.0	NNE	6.9	-	N/A	Smoke
6:56 PM	91.4	21.2	8	29.78	3.0	ENE	3.5	-	N/A	Smoke
7:56 PM	84.2	28.4	13	29.80	3.0	Calm	Calm	-	N/A	Smoke
8:56 PM	77.0	28.4	17	29.83	4.0	WNW	4.6	-	N/A	Smoke
9:56 PM	77.0	30.0	18	29.92	6.0	WNW	9.2	-	N/A	Smoke
10:56 PM	71.6	30.2	22	29.86	10.0	WSW	8.1	-	N/A	Clear
11:56 PM	69.1	30.9	24	29.87	10.0	West	8.1	-	N/A	Clear

Source: https://www.wunderground.com/history/

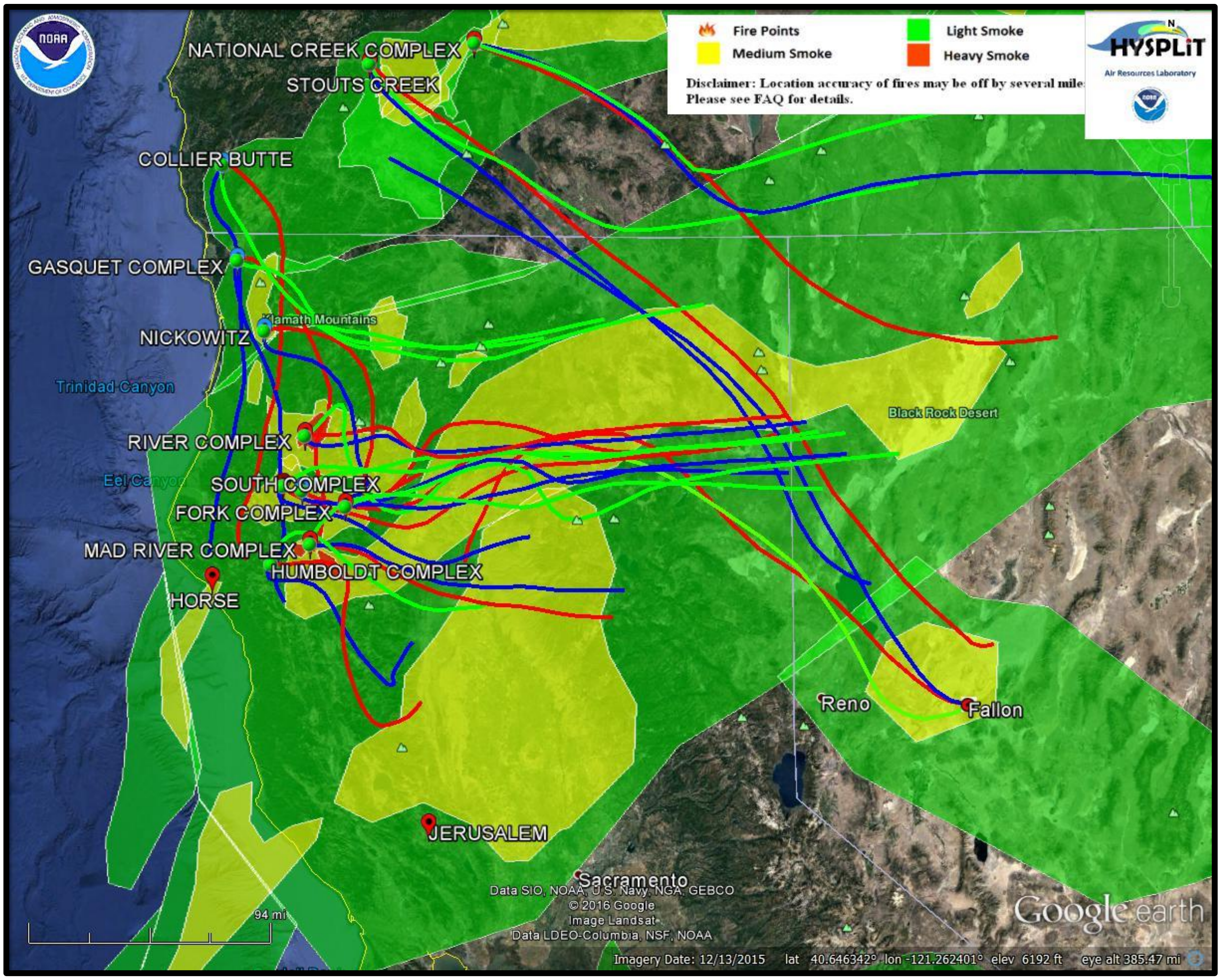
August 22, 2015

Time (PDT)	Temperature (°F)	Dew Point (°F)	Humidity (%)	Pressure (in Hg)	Visibility (miles)	Wind Direction	Wind Speed (mph)	Gust Speed (mph)	Precipitation (inches)	Conditions
12:56 AM	64.0	28.9	27	29.88	10.0	SSE	6.9	-	N/A	Clear
1:56 AM	64.0	28.9	27	29.89	10.0	Variable	4.6	-	N/A	Clear
2:56 AM	63.0	28.0	27	29.89	10.0	SSE	9.2	-	N/A	Clear
3:56 AM	61.0	28.0	29	29.90	10.0	SW	3.5	-	N/A	Clear
4:56 AM	55.9	28.0	34	29.91	10.0	South	3.5	-	N/A	Clear
5:56 AM	57.9	28.0	32	29.92	10.0	WSW	4.6	-	N/A	Clear
6:56 AM	59.0	32.0	36	29.94	9.0	West	4.6	-	N/A	Clear
7:56 AM	69.1	33.1	26	29.96	10.0	Calm	Calm	-	N/A	Clear
8:56 AM	73.9	28.9	19	29.97	10.0	NNW	8.1	-	N/A	Clear
9:56 AM	78.1	28.0	16	29.97	10.0	NW	3.5	-	N/A	Clear
10:56 AM	82.9	28.0	14	29.97	10.0	North	8.1	-	N/A	Clear
11:56 AM	84.9	30.0	14	29.96	10.0	Variable	3.5	-	N/A	Clear
12:56 PM	89.1	30.0	12	29.93	10.0	North	6.9	-	N/A	Clear
1:56 PM	90.0	30.0	12	29.91	10.0	NW	5.8	-	N/A	Clear
2:56 PM	93.0	30.9	11	29.89	10.0	Variable	3.5	-	N/A	Clear
3:56 PM	93.9	30.0	10	29.87	9.0	WNW	4.6	-	N/A	Clear
4:56 PM	93.0	28.0	10	29.86	9.0	Variable	3.5	-	N/A	Clear
5:56 PM	95.0	25.0	8	29.85	9.0	North	9.2	-	N/A	Clear
6:56 PM	91.9	28.9	11	29.85	9.0	North	5.8	-	N/A	Clear
7:56 PM	80.1	33.1	18	29.86	10.0	NNE	8.1	-	N/A	Clear
8:56 PM	75.9	28.9	18	29.87	10.0	North	8.1	-	N/A	Clear
9:56 PM	73.0	30.0	20	29.88	10.0	NNE	8.1	-	N/A	Clear
10:56 PM	69.1	28.9	22	29.89	10.0	South	4.6	-	N/A	Clear
11:56 PM	64.9	30.0	27	29.90	10.0	WSW	3.5	-	N/A	Clear

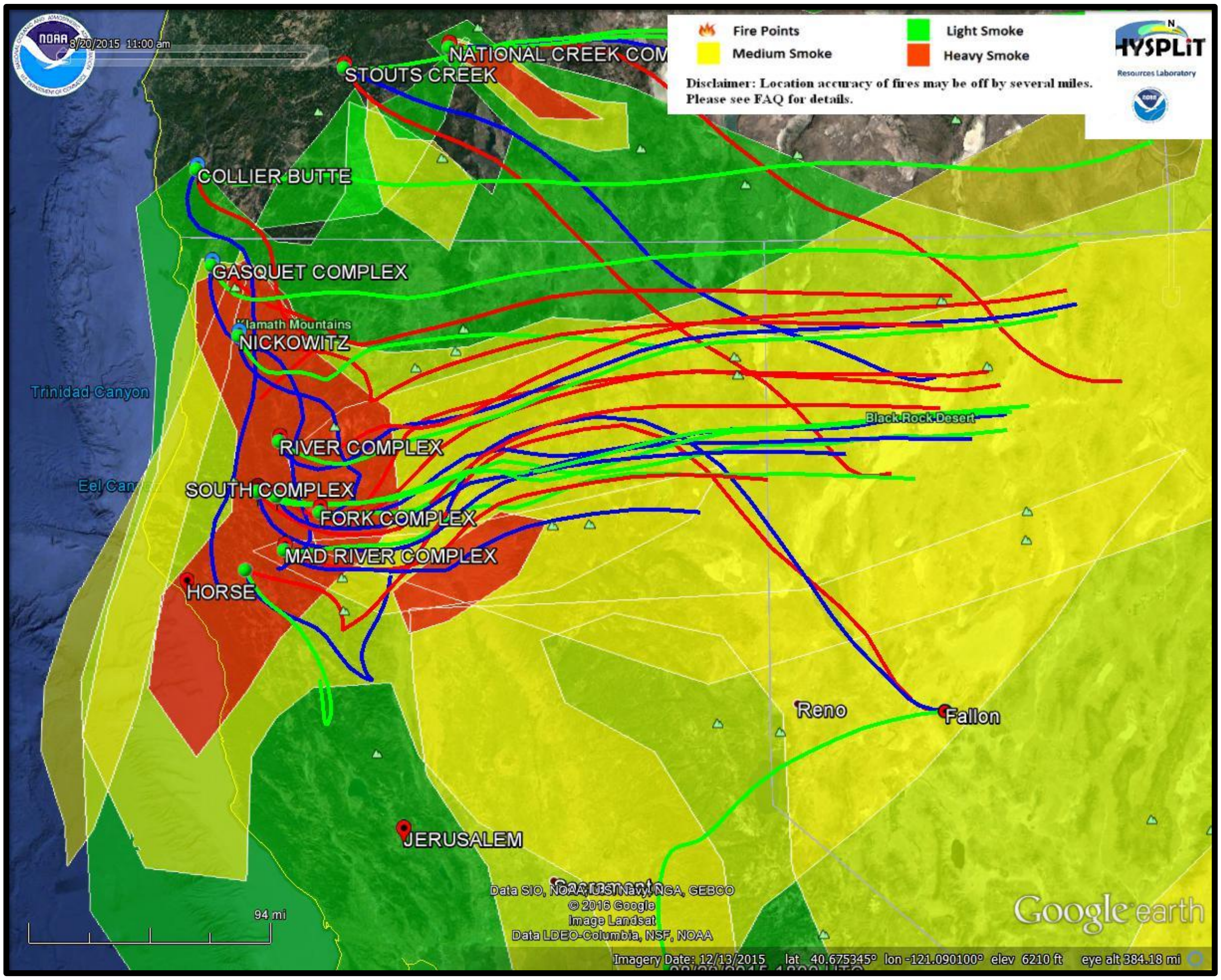
Source: https://www.wunderground.com/history/

APPENDIX E

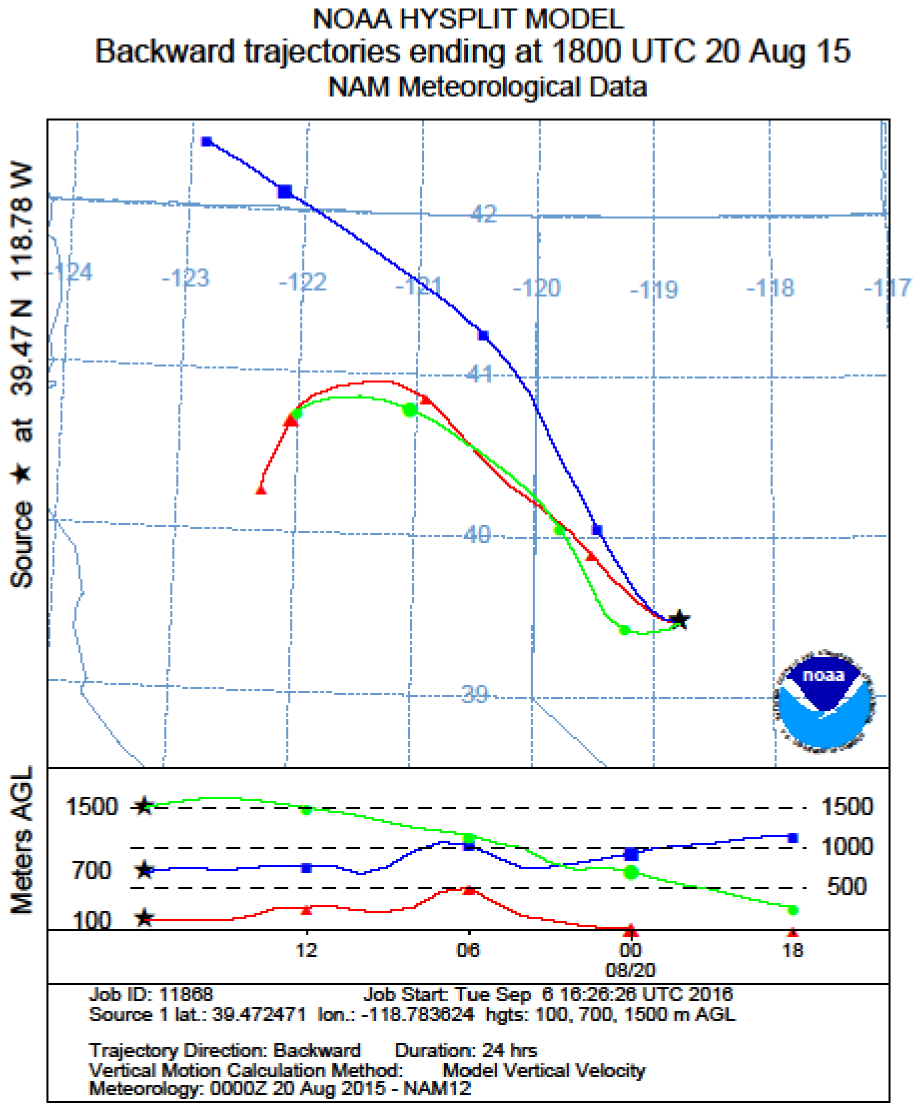
HYSPLIT Model Outputs



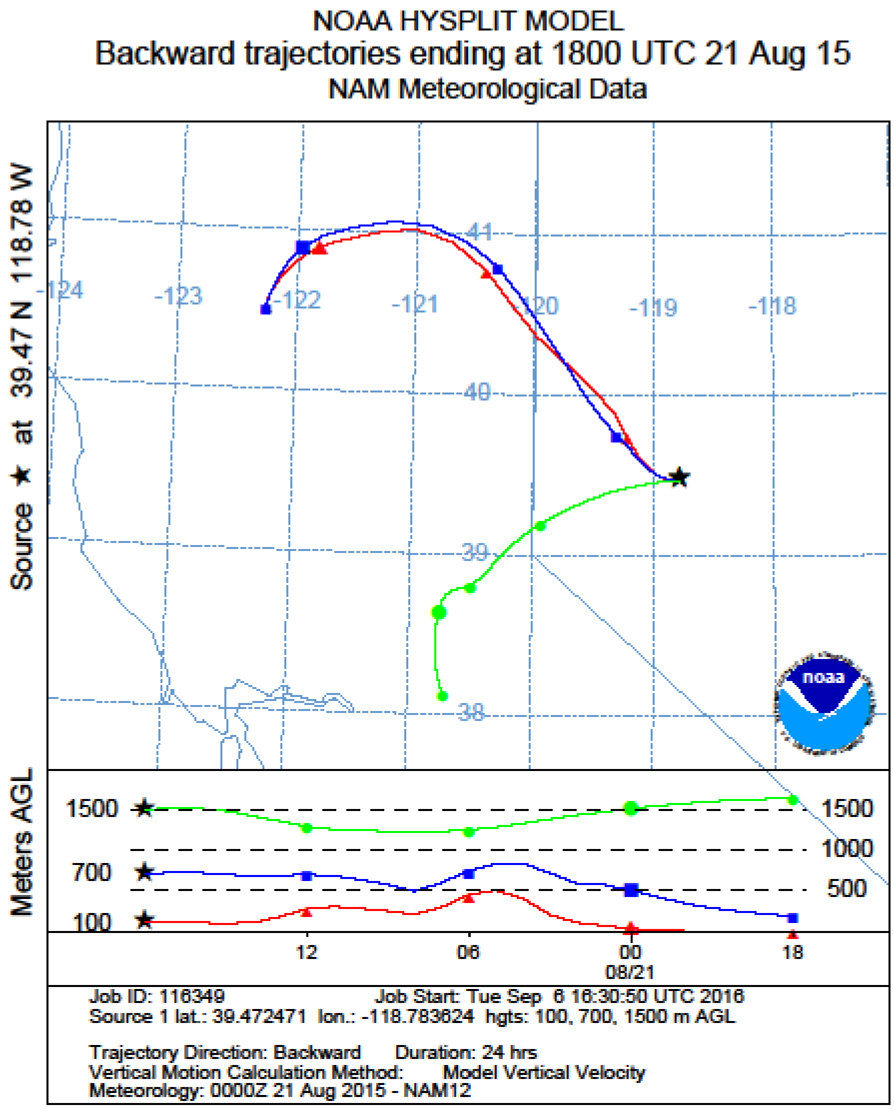
Smoke Plume and Forward and Backward Trajectories – August 20, 2015
Red: 100 m agl, blue: 700 m agl, green: 1,500 m agl.



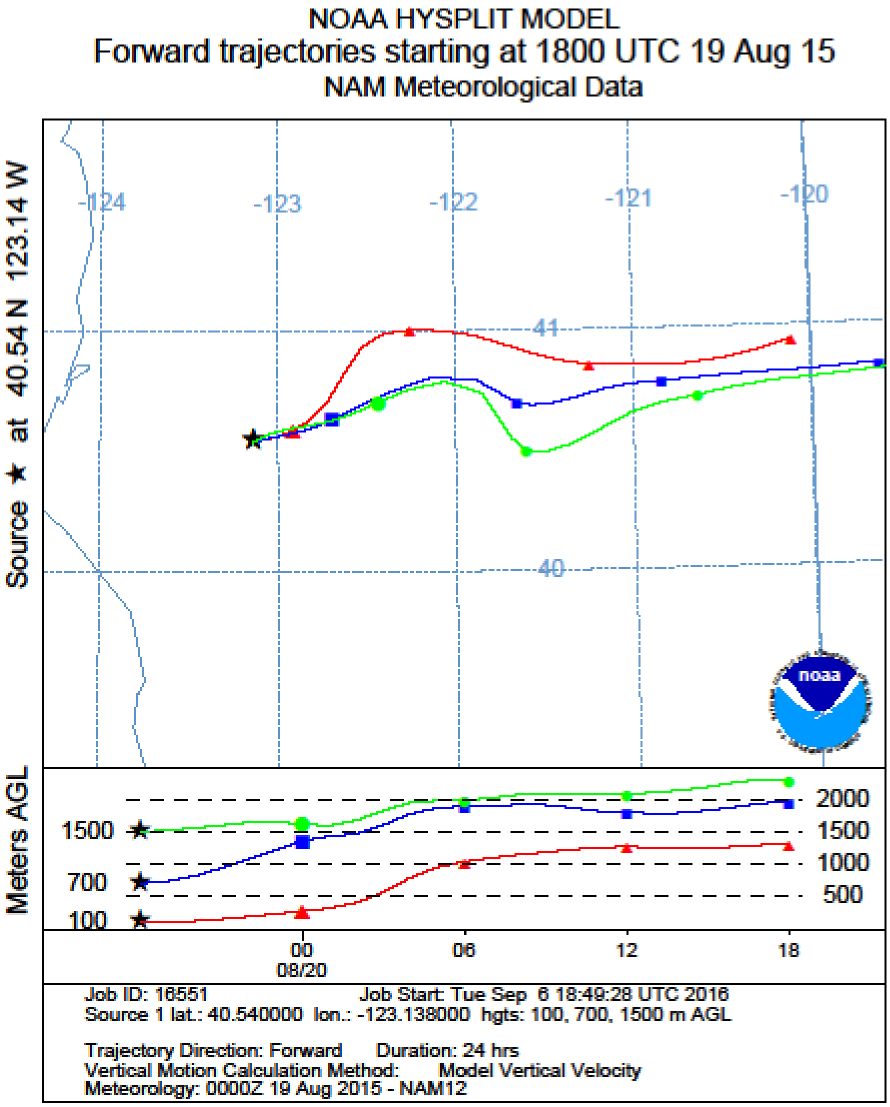
Smoke Plume and Forward and Backward Trajectories – August 21, 2015
Red: 100 m agl, blue: 700 m agl, green: 1,500 m agl.



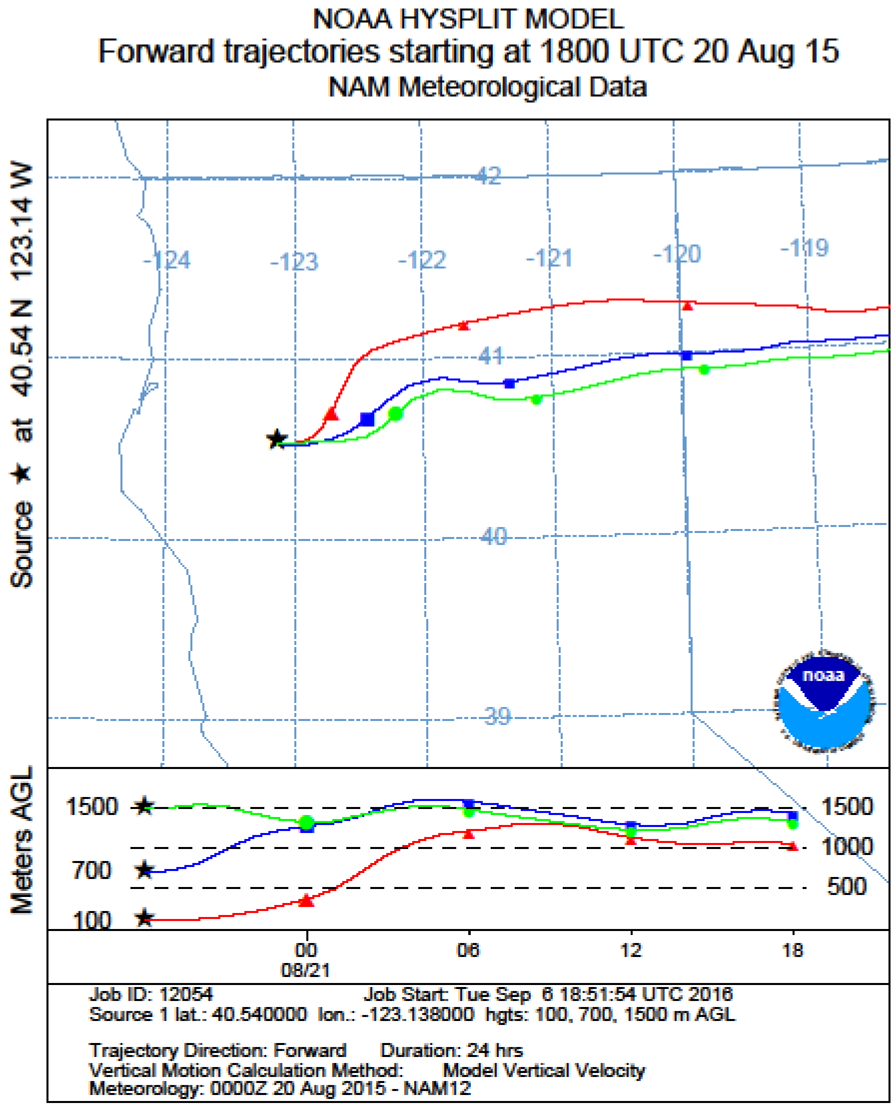
Backward trajectory from Fallon, Nevada, initiated at 1800 UTC (1000 PST) August 20, 2015.



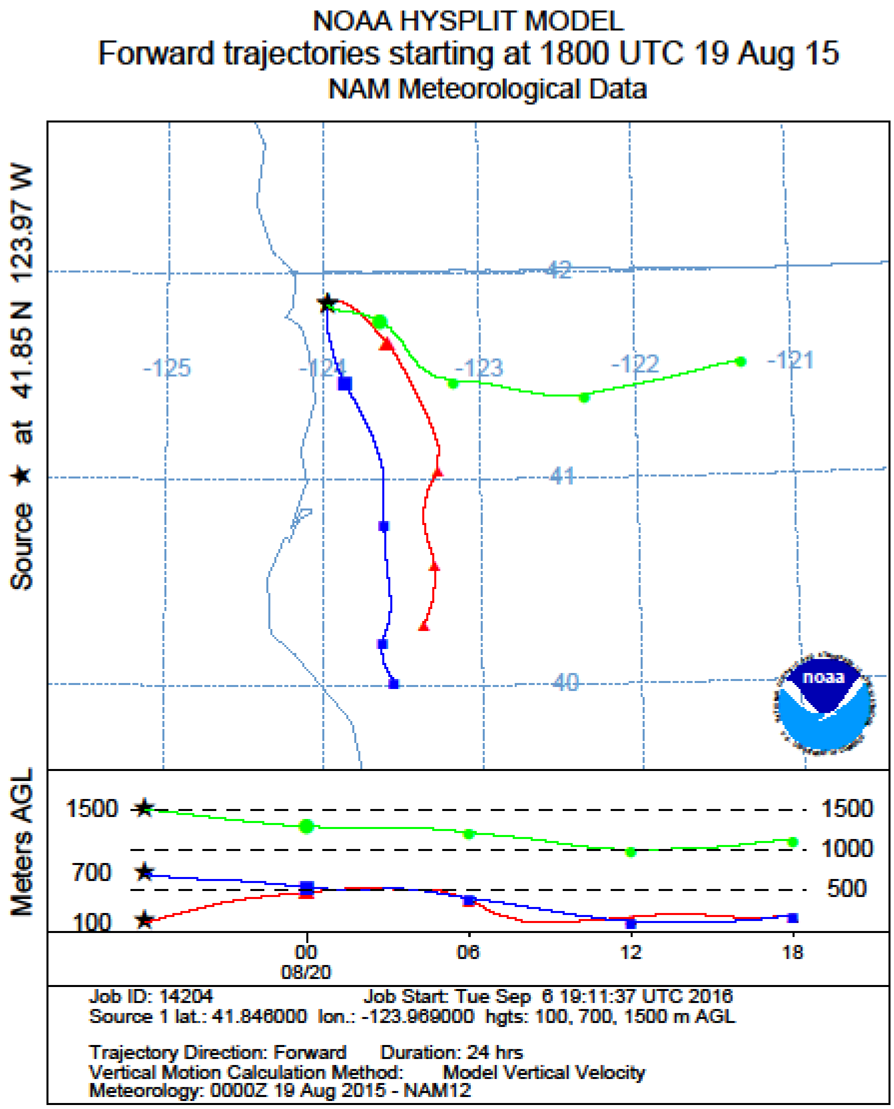
Backward trajectory from Fallon, Nevada, initiated at 1800 UTC (1000 PST) August 21, 2015.



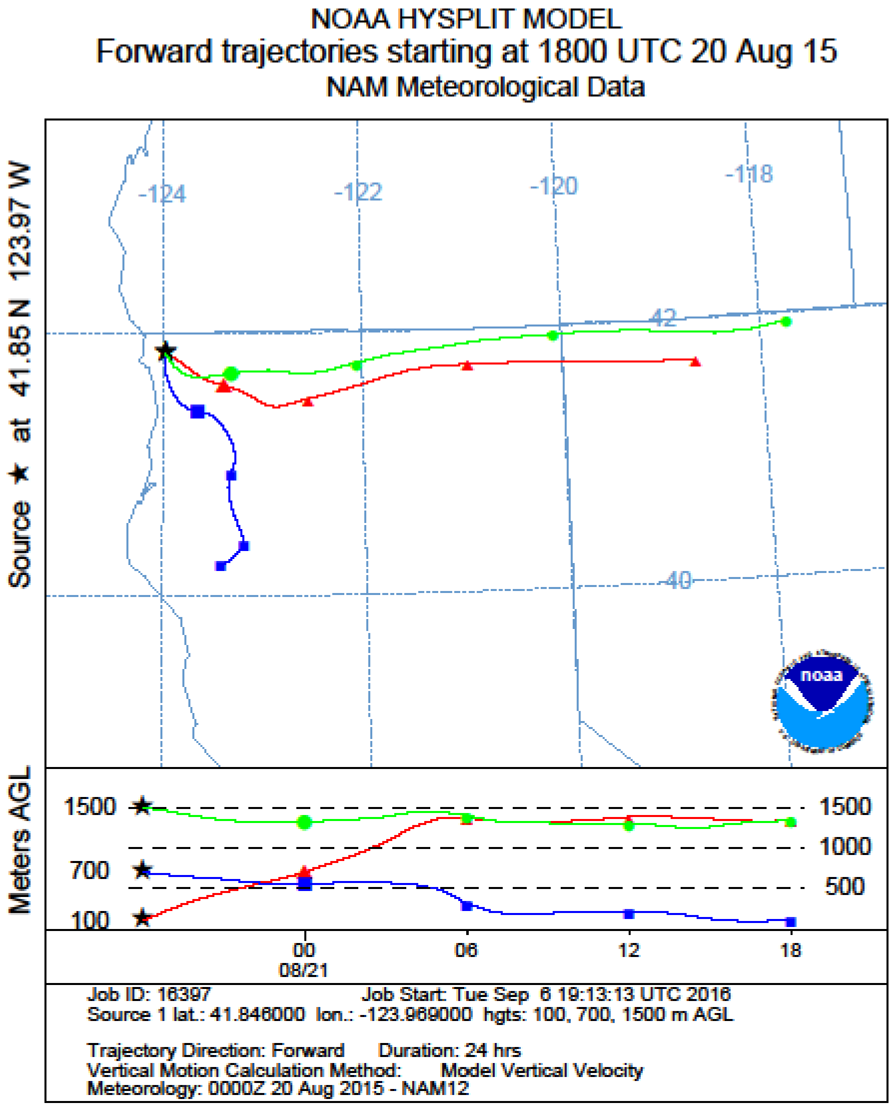
Forward trajectory from the Fork Complex (40.54N, 123.138W), initiated at 1800 UTC (1000 PST) August 19, 2015.



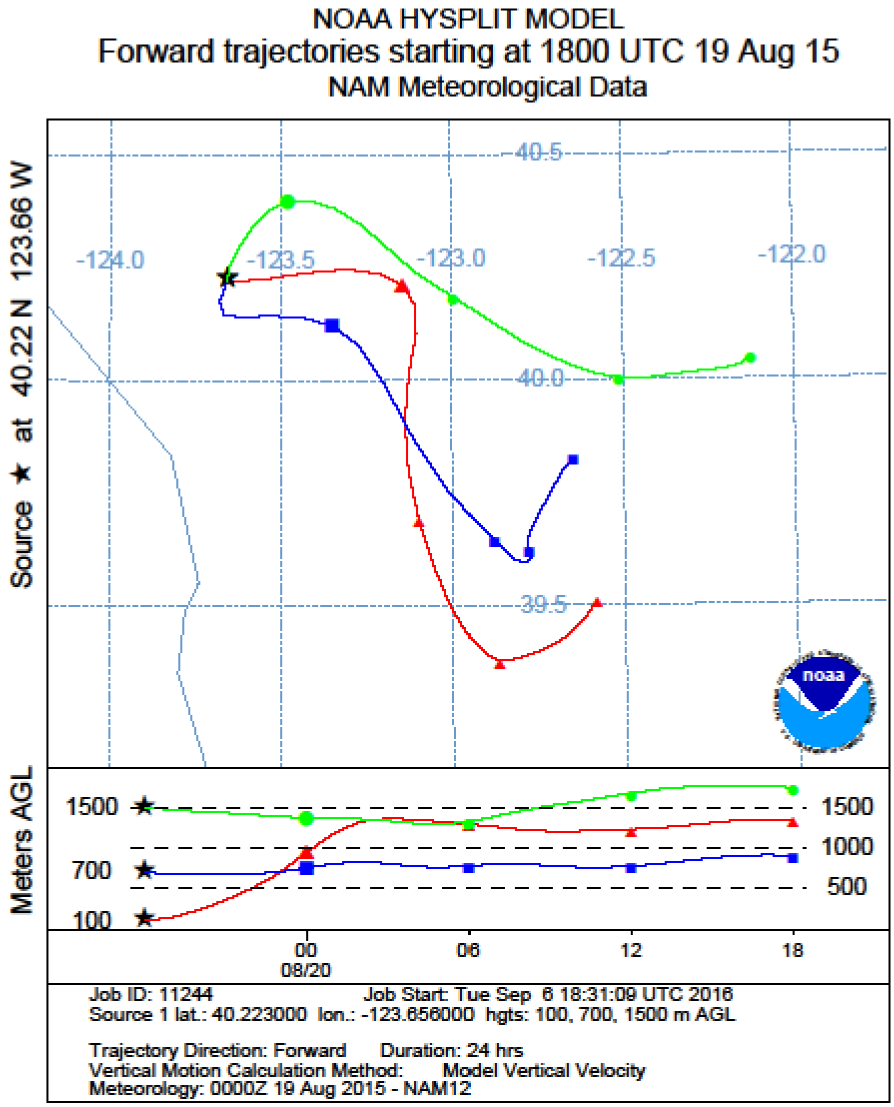
Forward trajectory from the Fork Complex (40.54N, 123.138W), initiated at 1800 UTC (1000 PST) August 20, 2015.



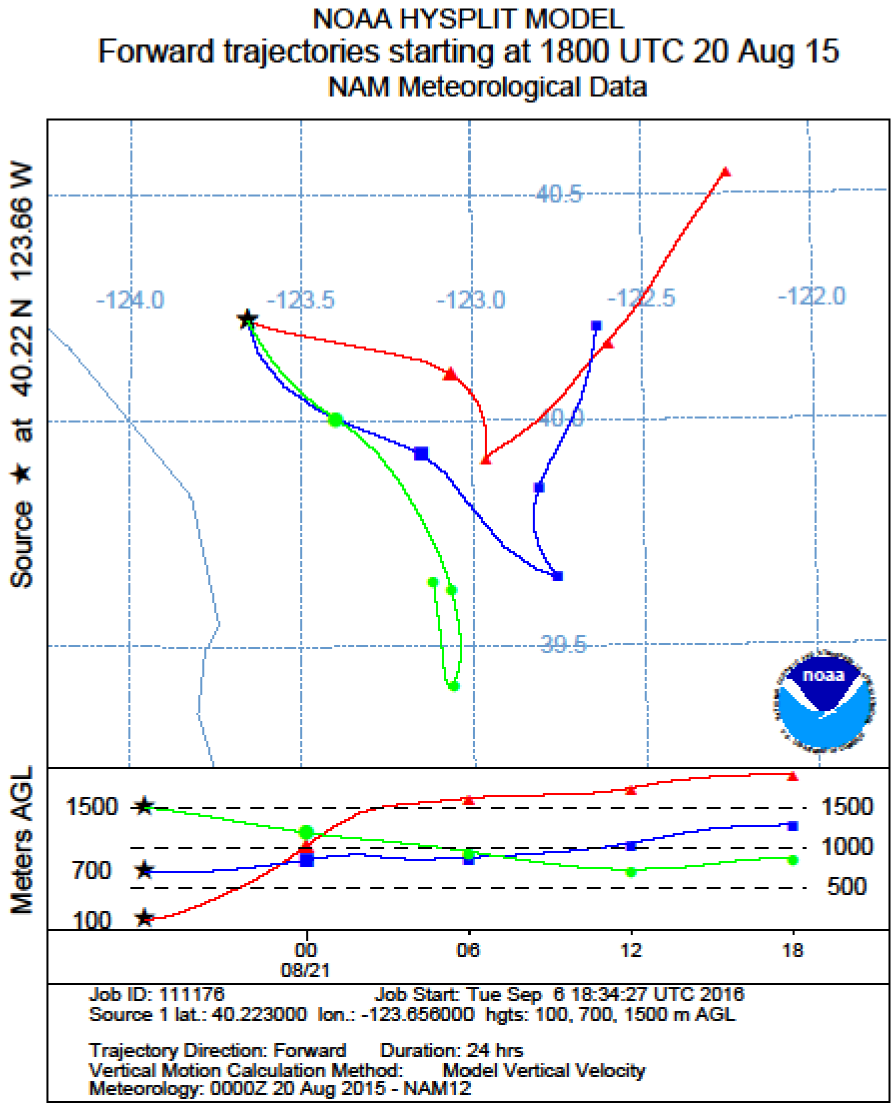
Forward trajectory from the Gasquet Complex (41.846N, 123.969W), initiated at 1800 UTC (1000 PST) August 19, 2015.



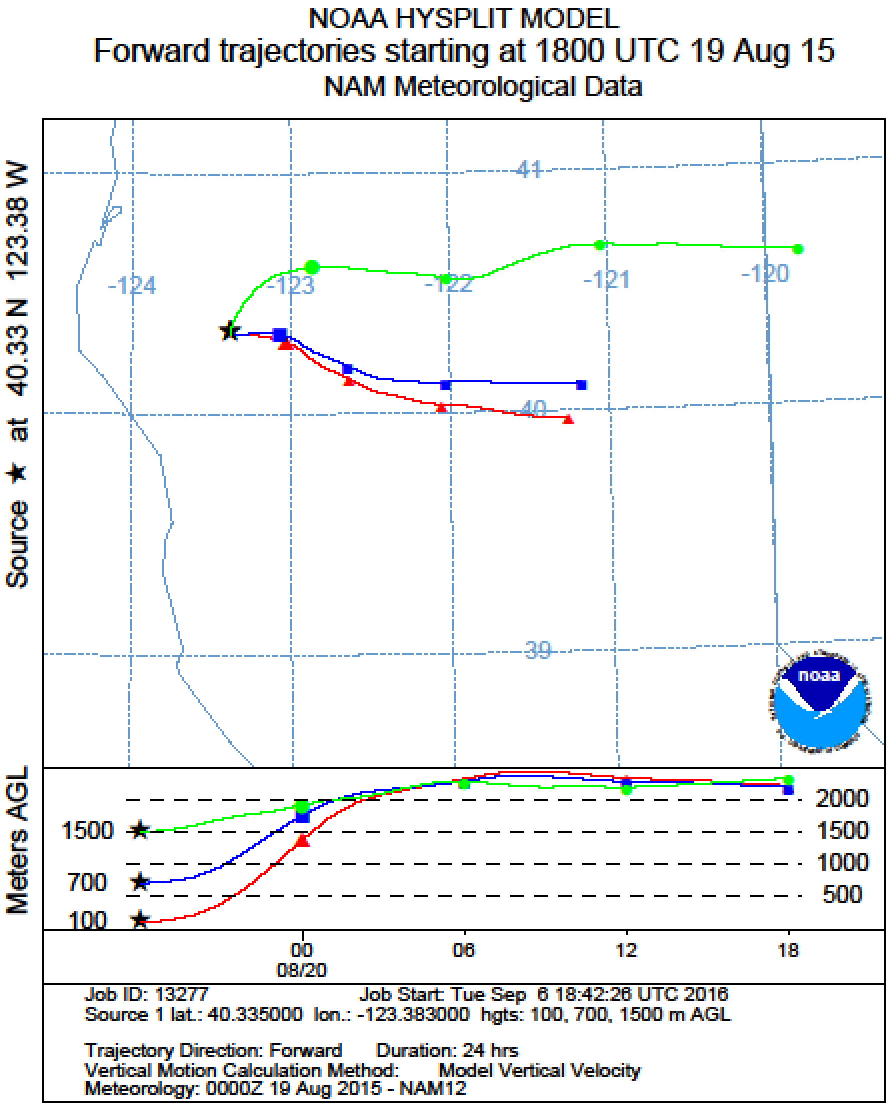
Forward trajectory from the Gasquet Complex (41.846N, 123.969W), initiated at 1800 UTC (1000 PST) August 20, 2015.



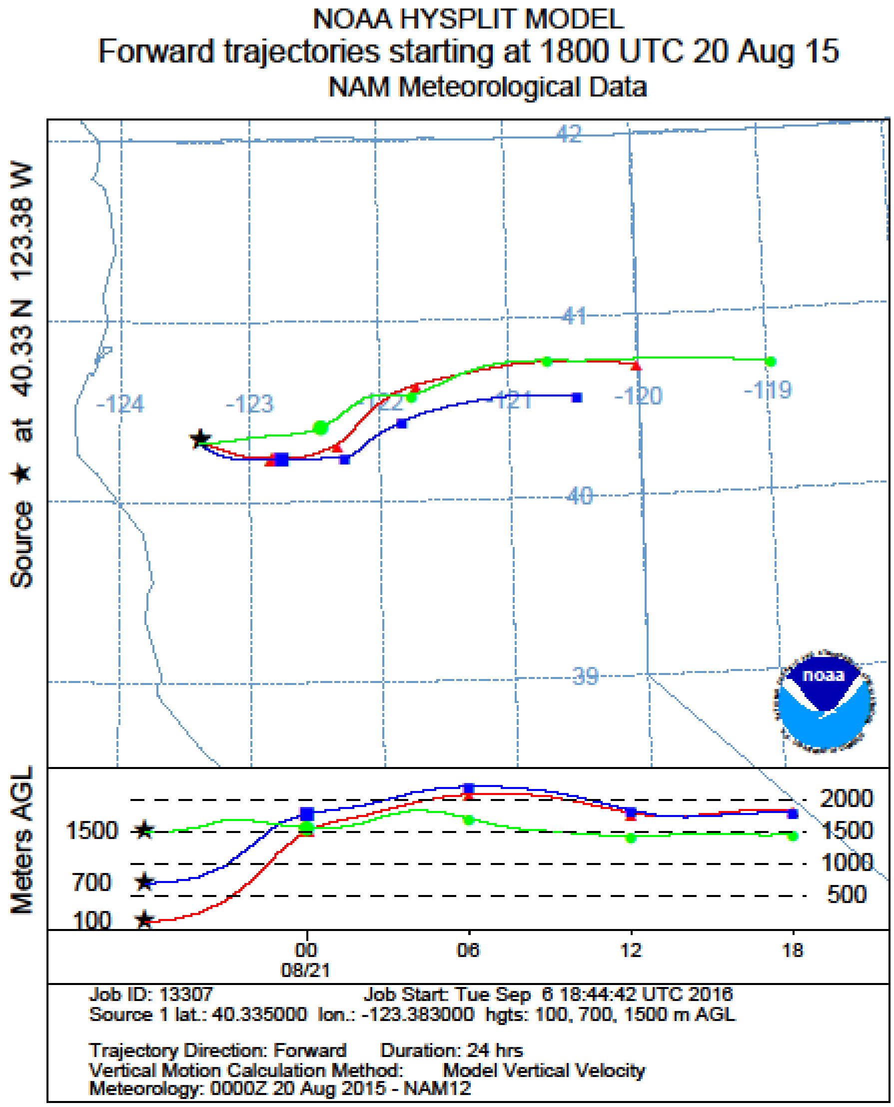
Forward trajectory from the Humboldt Complex (40.223N, 123.656W), initiated at 1800 UTC (1000 PST) August 19, 2015.



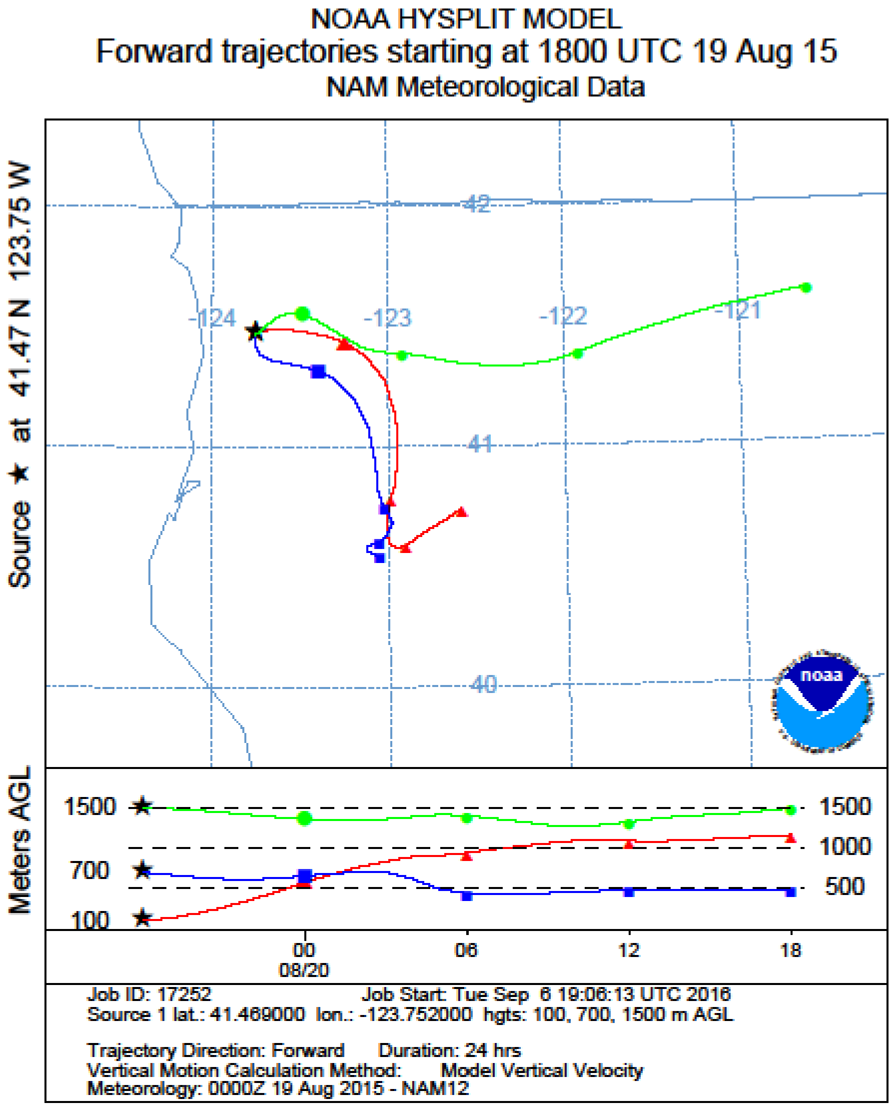
Forward trajectory from the Humboldt Complex (40.223N, 123.656W), initiated at 1800 UTC (1000 PST) August 20, 2015.



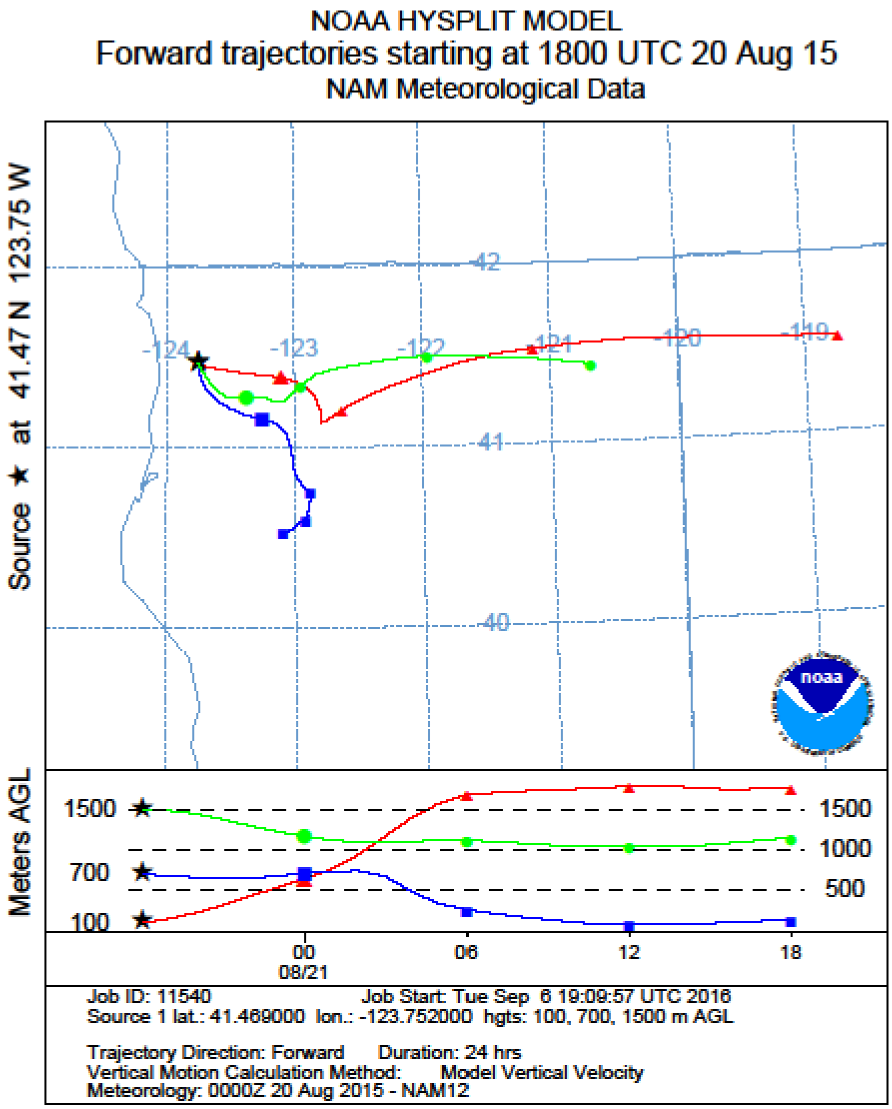
Forward trajectory from the Mad River Complex (40.335N, 123.383W), initiated at 1800 UTC (1000 PST) August 19, 2015



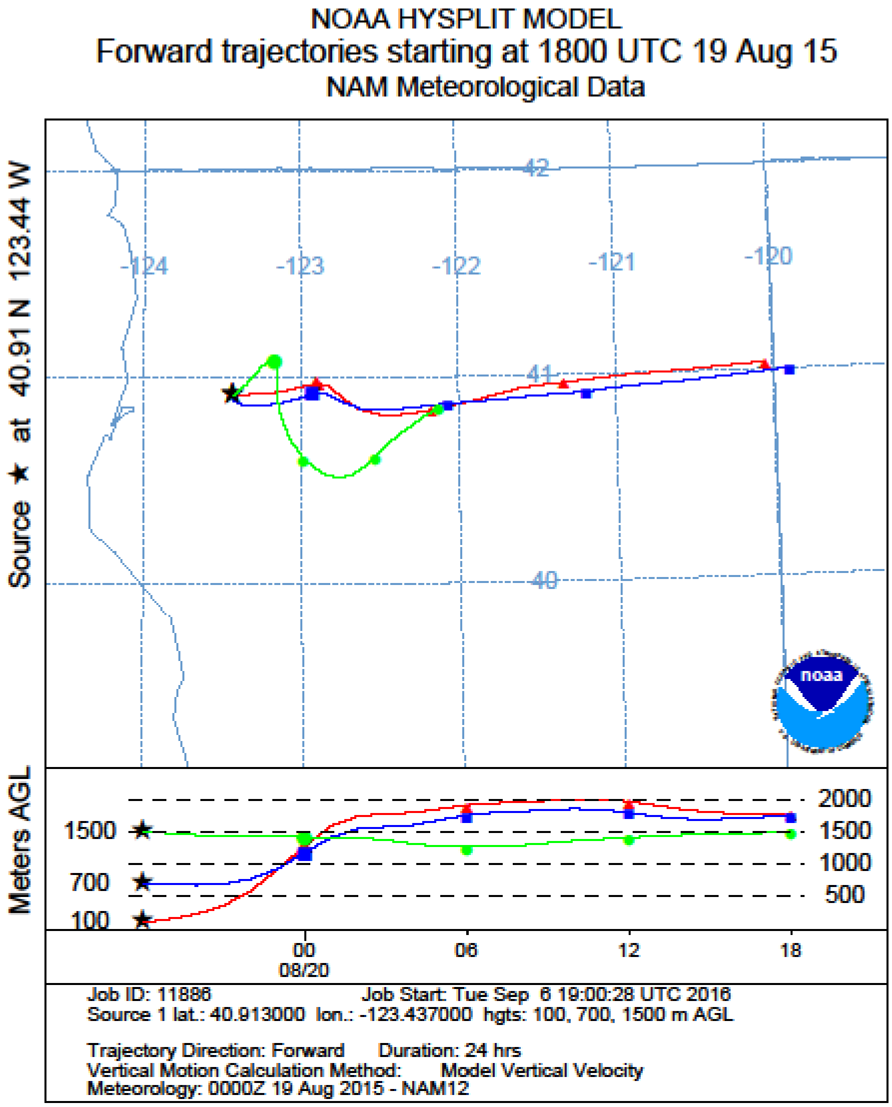
Forward trajectory from the Mad River Complex (40.335N, 123.383W), initiated at 1800 UTC (1000 PST) August 20, 2015



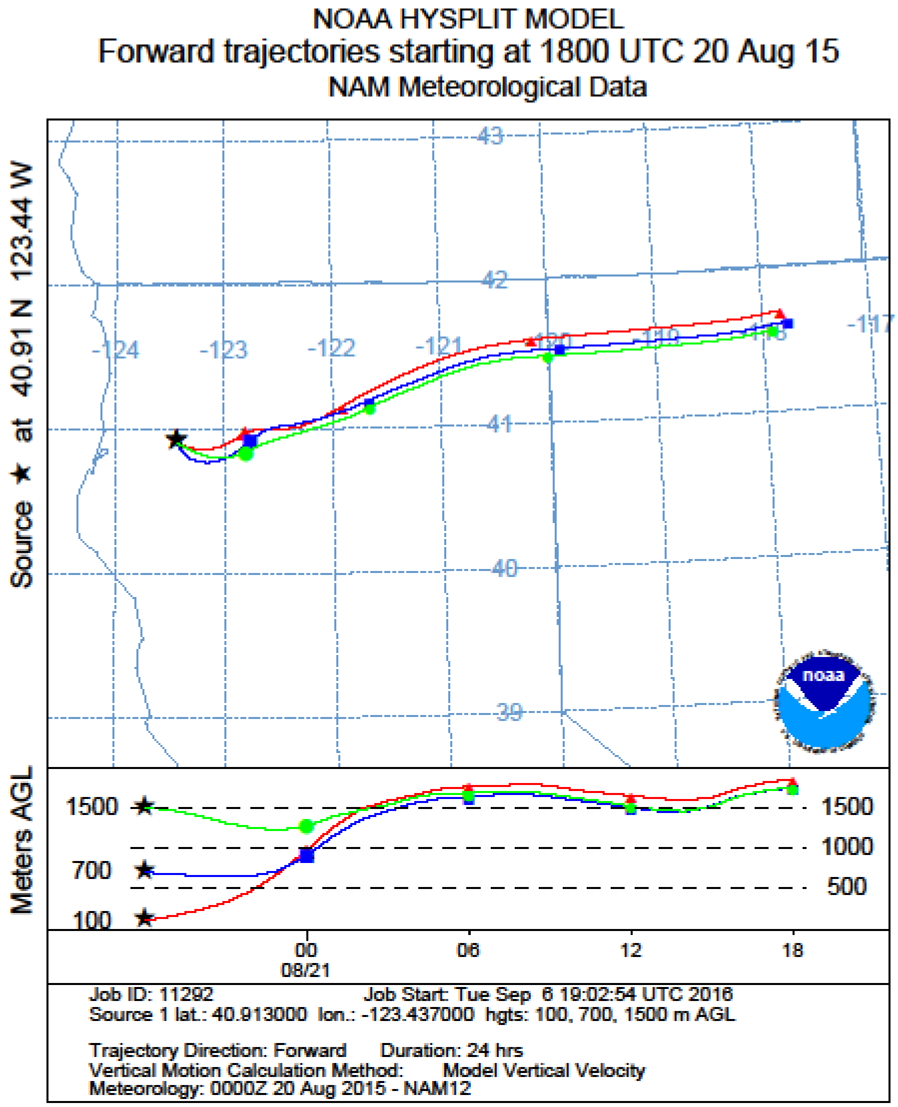
Forward trajectory from the Nickowitz Fire (41.469N, 123.752W), initiated at 1800 UTC (1000 PST) August 19, 2015



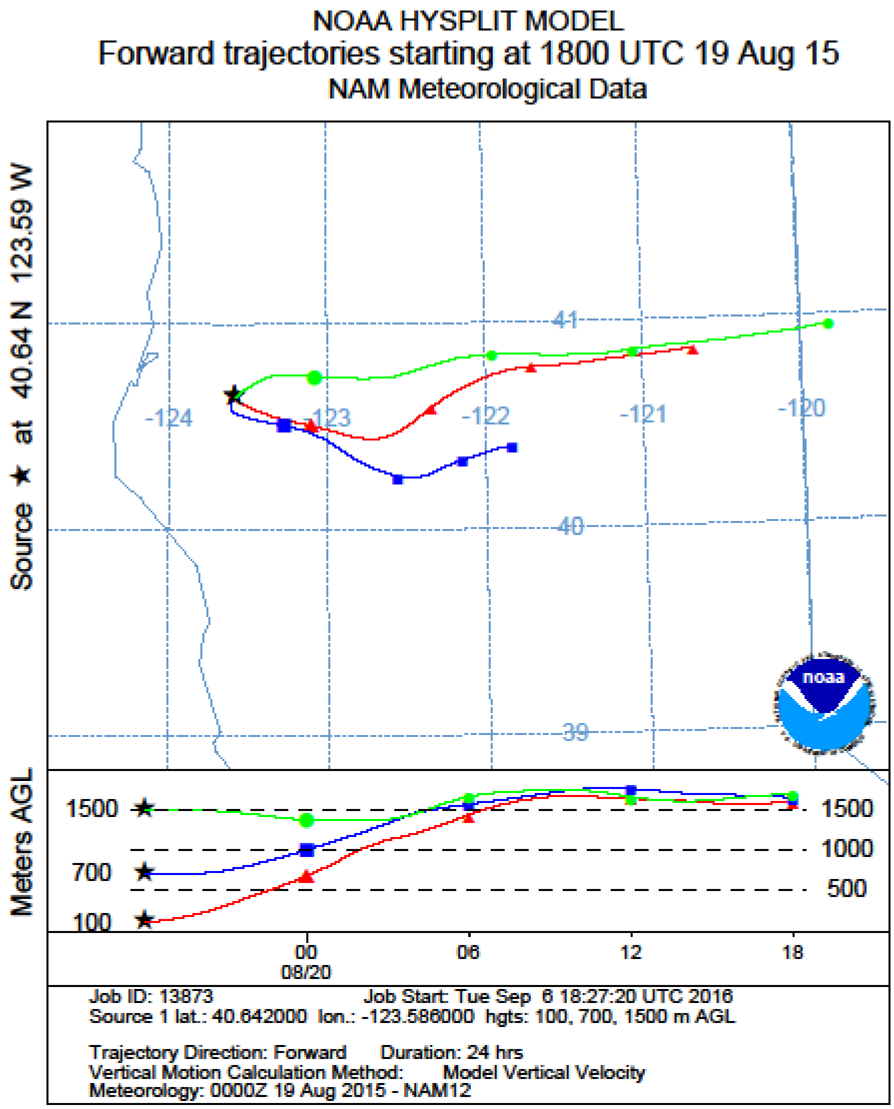
Forward trajectory from the Nickowitz Fire (41.469N, 123.752W), initiated at 1800 UTC (1000 PST) August 20, 2015



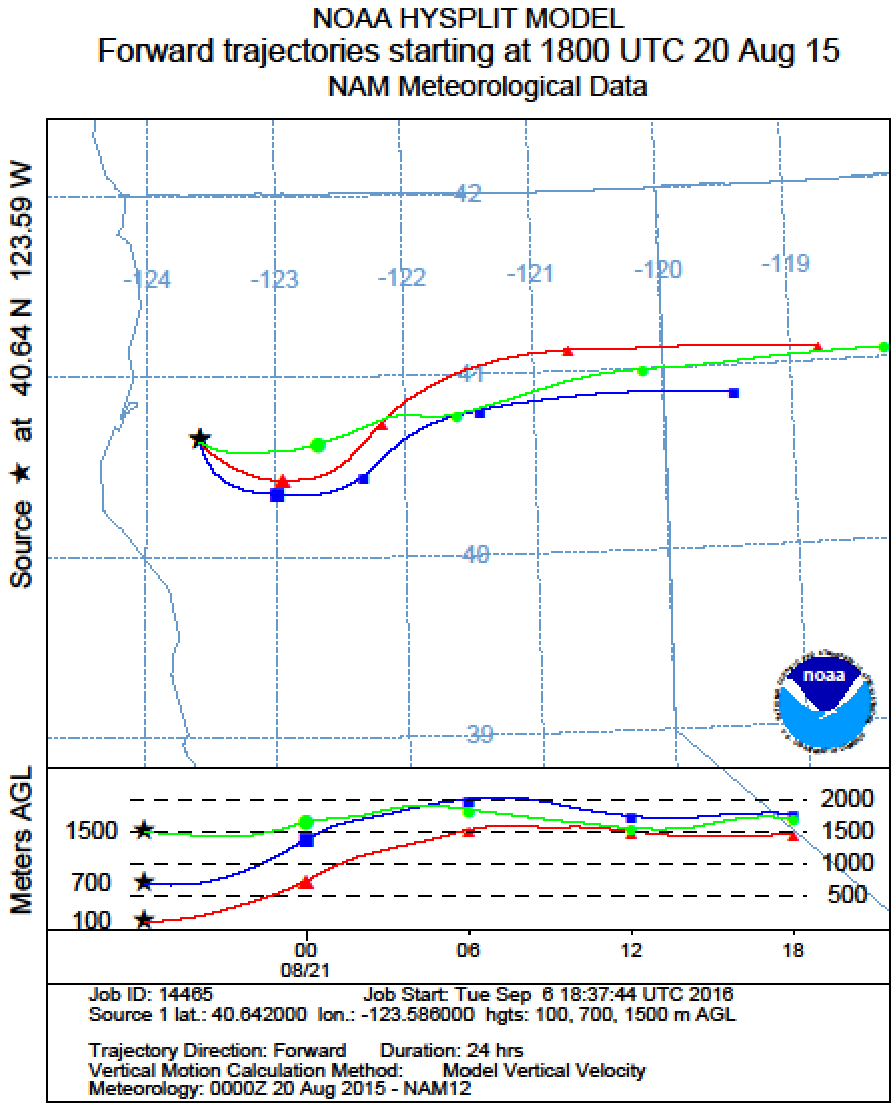
Forward trajectory from the River Complex (40.913N, 123.437W), initiated at 1800 UTC (1000 PST) August 19, 2015



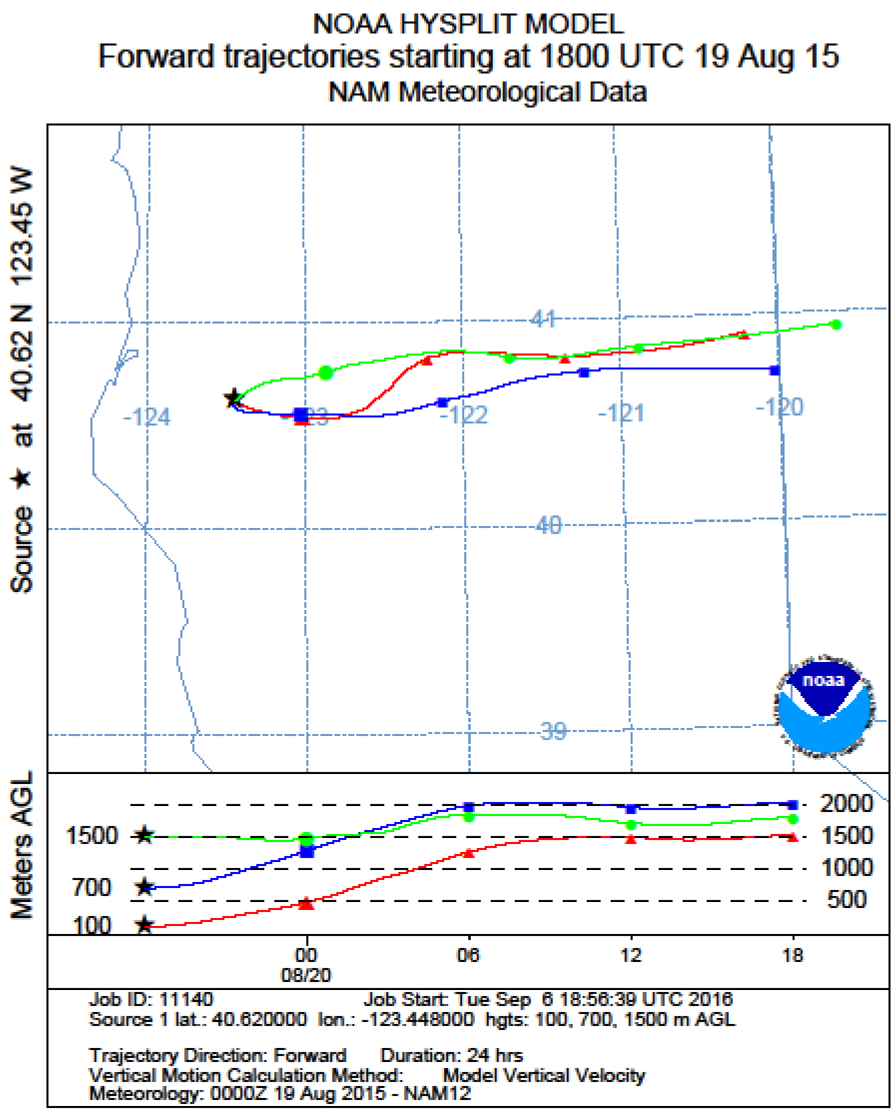
Forward trajectory from the River Complex (40.913N, 123.437W), initiated at 1800 UTC (1000 PST) August 20, 2015



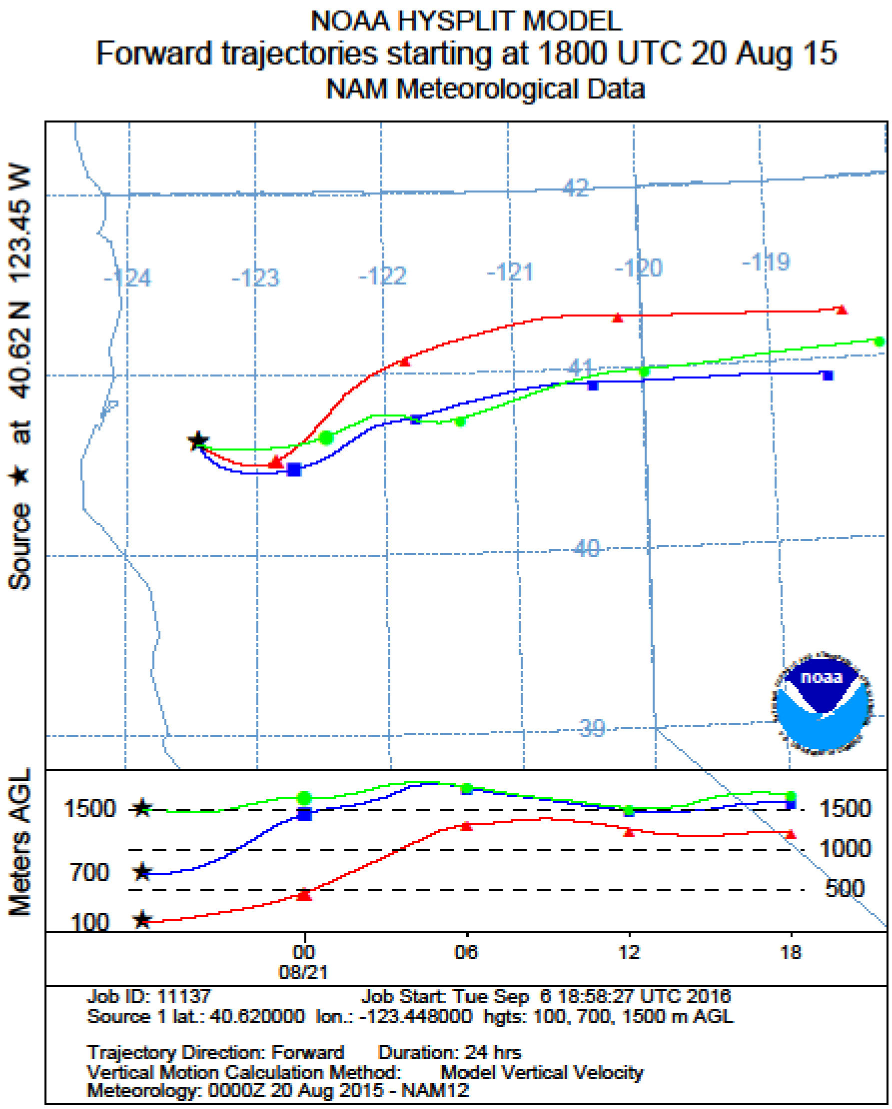
Forward trajectory from the Route Complex (40.642N, 123.586W), initiated at 1800 UTC (1000 PST) August 19, 2015



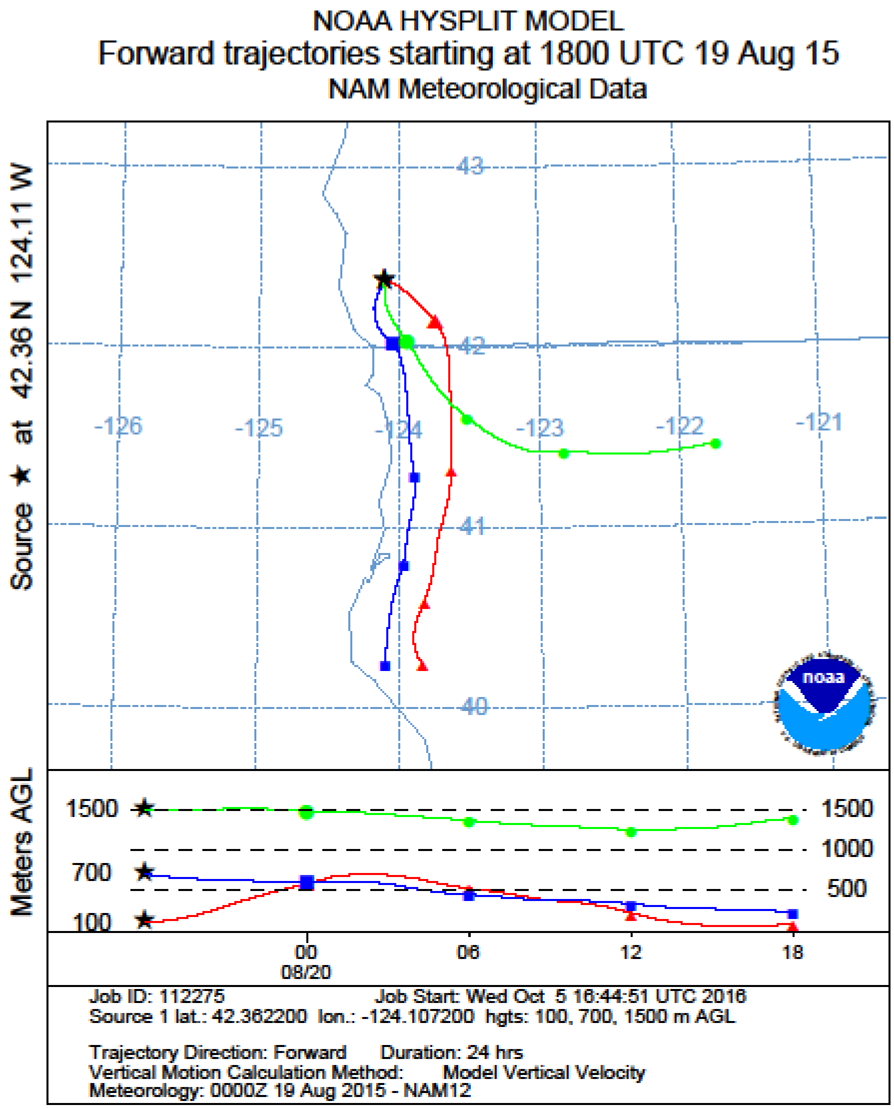
Forward trajectory from the Route Complex (40.642N, 123.586W), initiated at 1800 UTC (1000 PST) August 20, 2015



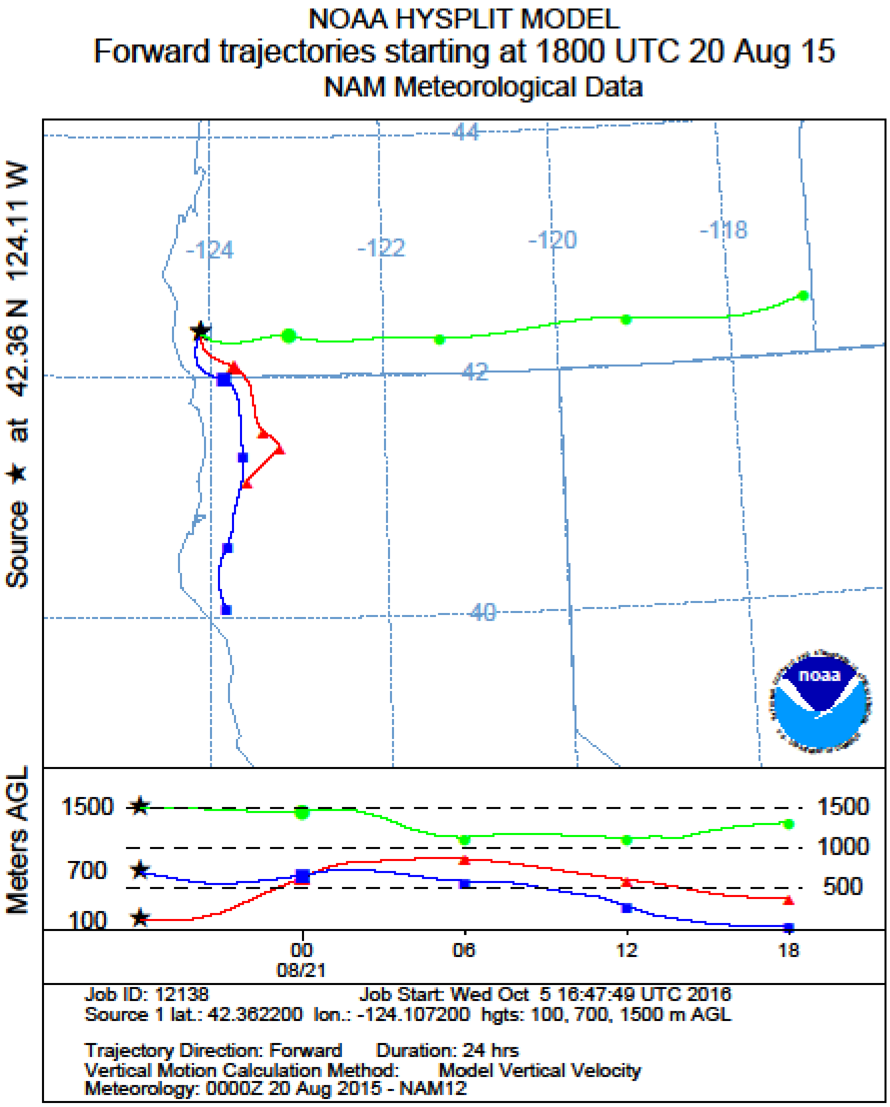
Forward trajectory from the South Complex (40.620N, 123.448W), initiated at 1800 UTC (1000 PST) August 19, 2015



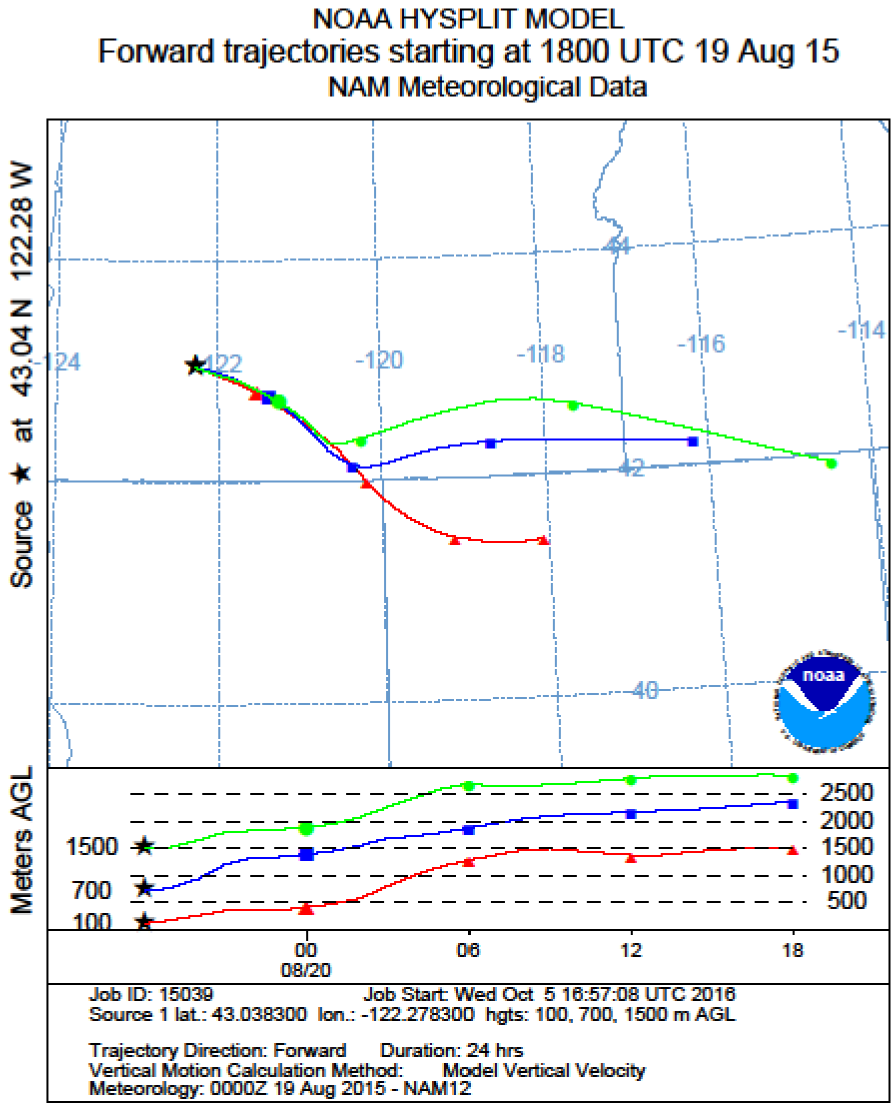
Forward trajectory from the South Complex (40.620N, 123.448W), initiated at 1800 UTC (1000 PST) August 20, 2015



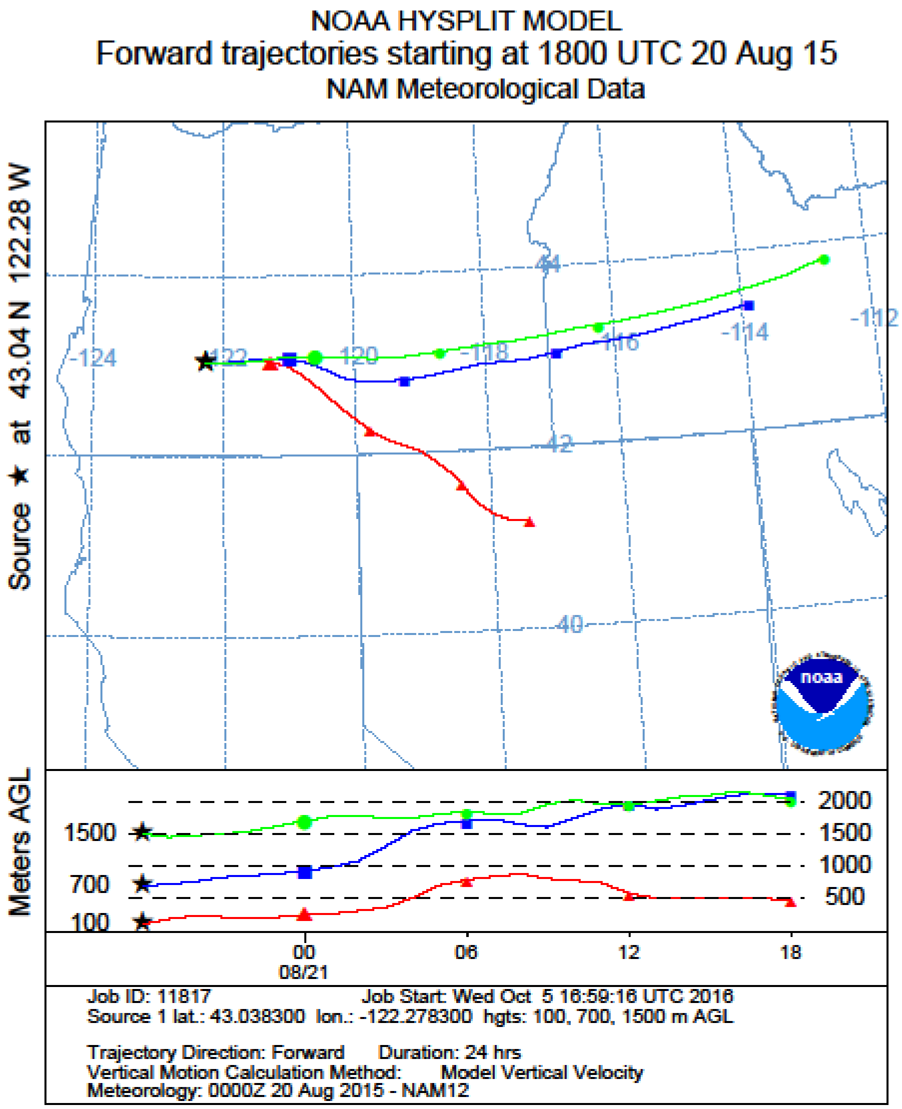
Forward trajectory from the Collier Butte Fire (42.362N, 124.107W), initiated at 1800 UTC (1000 PST) August 19, 2015



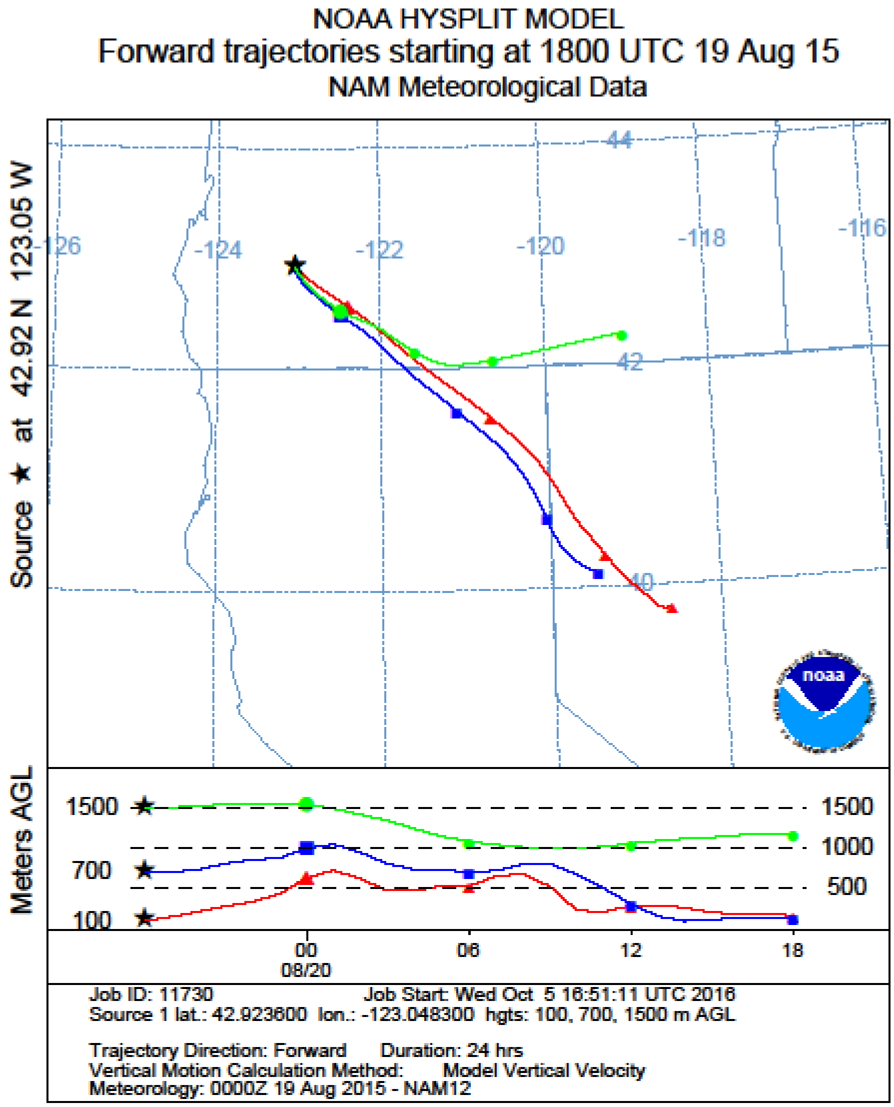
Forward trajectory from the Collier Butte Fire (42.362N, 124.107W), initiated at 1800 UTC (1000 PST) August 20, 2015



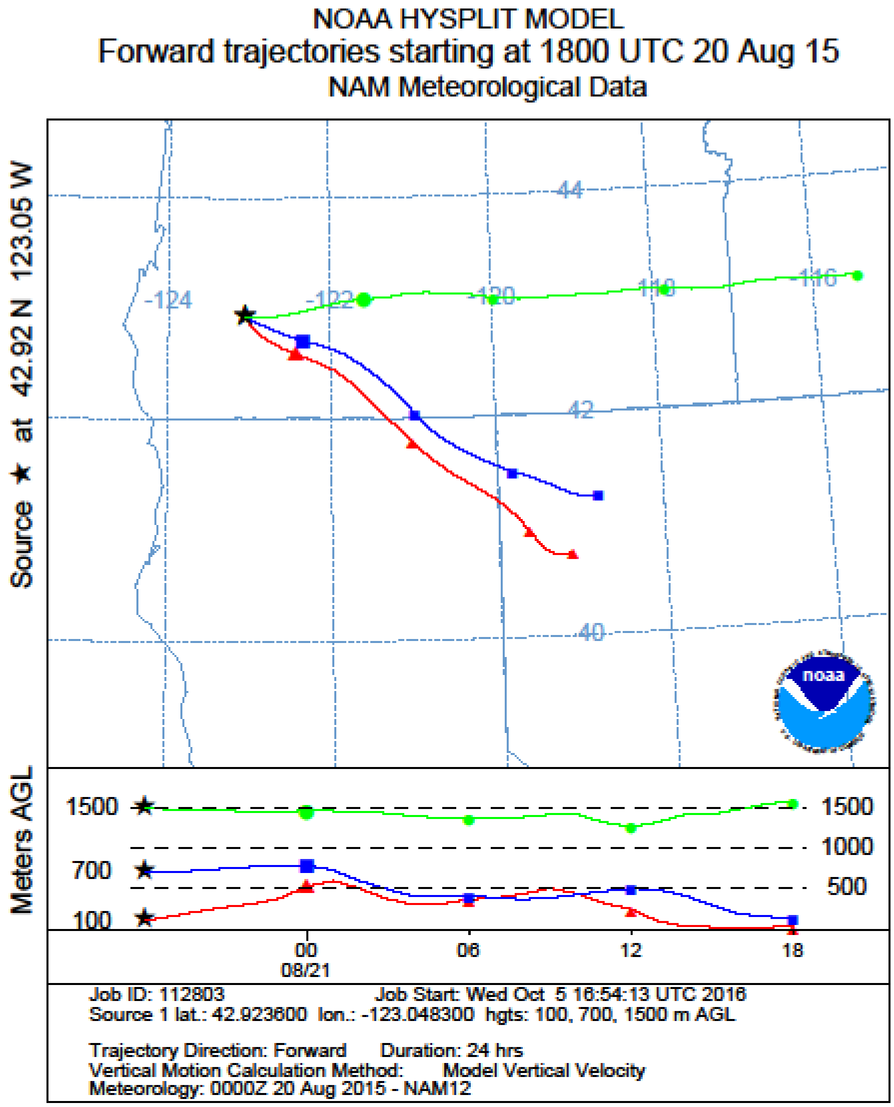
Forward trajectory from the National Creek Complex (43.038N, 122.278W), initiated at 1800 UTC (1000 PST) August 19, 2015



Forward trajectory from the National Creek Complex (43.038N, 122.278W), initiated at 1800 UTC (1000 PST) August 20, 2015



Forward trajectory from the Stouts Creek Fire (42.924N, 123.048W), initiated at 1800 UTC (1000 PST) August 19, 2015



Forward trajectory from the Stouts Creek Fire (42.924N, 123.048W), initiated at 1800 UTC (1000 PST) August 20, 2015