EL PASO UTEP (CAMS 12) MONITORING SITE

JUNE 21, 2015

EXCEPTIONAL EVENT DEMONSTRATION PACKAGE
For the El Paso County Maintenance Area

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. BOX 13087
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LIST OF ACRONYMS

AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
CAA	Clean Air Act
CAMS	Continuous Air Monitoring Station
CFR	Code of Federal Regulations
CO	Carbon Monoxide
EPA	Environmental Protection Agency
EER	Exceptional Events Rule
°F	degrees Fahrenheit
FCAA	Federal Clean Air Act
GOES	Geostationary Operational Environmental Satellite
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory
km	Kilometer
LEADS	Leading Environmental Analysis and Display System
LST	Local Standard Time
ly/min	Langley/minute
m	Meter
MDT	Mountain Daylight Time
MODIS	Moderate Resolution Imaging Spectroradiometer
NAAQS	National Ambient Air Quality Standards
NARR	North American Regional Reanalysis
NASA	National Aeronautics and Space Administration
nm	Nanometer

NOAA	National Oceanic and Atmospheric Administration
NO_X	Nitrogen Oxides
NO2	Nitrogen Dioxide
NWS	National Weather Service
OC	Organic Carbon
PM	Particulate Matter
PM2.5	Fine Particulate Matter less than or equal to 2.5 microns in diameter
PM10	Particulate Matter less than or equal to 10 microns in diameter
ppb	parts per billion
ppm	parts per million
SIP	State Implementation Plan
TCEQ	Texas Commission on Environmental Quality
TOMS	Total Ozone Mapping Spectrometer
U.S.	United States
UTC	Coordinated Universal Time
UTEP	University of Texas at El Paso
VOC	Volatile Organic Compounds

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EXECUTIVE SUMMARY

On August 21, 2015, the El Paso University of Texas at El Paso (UTEP) (CAMS 12) monitoring site measured a maximum daily eight-hour average ozone concentration of 77 parts per billion (ppb) during the period from 11:00 AM to 7:00 PM Local Standard Time (12:00 to 8:00 Mountain Daylight Time). Pollutants from wildfires in southwestern New Mexico and eastern Arizona were transported to El Paso and raised ozone levels at the site beyond what they would otherwise have been. This maximum daily average creates an exceedance of the 2015 eight-hour ozone National Ambient Air Quality Standard (NAAQS) of 0.07 parts per million and results in the El Paso area having a 2015 eight-hour ozone design value of 71 ppb. This exceptional event could lead to a nonattainment designation for the El Paso area based on its 2015 or 2016 eight-hour ozone design values.

Based on an initial analysis, the Texas Commission on Environmental Quality (TCEQ) entered a preliminary flag and notified the United States Environmental Protection Agency (EPA) as required by the Exceptional Events Rule (EER). The TCEQ submits this Exceptional Events Demonstration Package in support of the claim that the El Paso area experienced an exceptional event on June 21, 2015, which caused an exceedance of the 2015 eight-hour ozone NAAQS. The TCEQ requests that the EPA concur with the technical demonstration contained in this document and enter an exceptional event concurrence flag for the appropriate Air Quality System (AQS) data records for the El Paso UTEP (CAMS 12) ozone measurements taken June 21, 2015.

The TCEQ's claim is substantiated through the accumulated weight of evidence documented in this package. Specifically, the fires occurring in Arizona and New Mexico:

- affected air quality in the El Paso area by causing elevated levels of ozone, fine particulate matter ($PM_{2.5}$), and carbon monoxide (CO);
- the fires were not reasonably preventable or controllable by the State of Texas because they occurred outside the state's borders;
- the fires, caused by lightning and human activity, are natural and human related events and not likely to recur;
- are associated with satellite imagery, Hybrid Single--Particle Lagrangian Integrated Trajectory (HYSPLIT) backwards trajectories, and surface monitoring data that show a clear causal relationship between the fires and the monitored concentrations;
- are associated with measured concentrations in excess of normal historical fluctuations including background; and
- caused an exceedance of the 2015 eight-hour ozone NAAQS that would not otherwise have occur.

CHAPTER 1: INTRODUCTION

On June 21, 2015, the El Paso University of Texas at El Paso (UTEP) (CAMS 12) monitoring site measured a maximum daily eight-hour ozone average of 77 parts per billion (ppb). This eight-hour period began at 11:00 AM Local Standard Time (LST) and lasted until 7:00 PM LST. The ozone average during this period were punctuated by two consecutive one-hour averages of 97 ppb. These measurements were elevated by emissions from the Hog fire in southeastern Arizona, which were transported approximately 155 miles across the deserts of New Mexico and Mexico before entering the El Paso area from south. Additional fires in eastern Arizona also contributed emissions. This demonstration will show that the Hog fire in Arizona caused the measured ozone exceedance in El Paso. The Texas Commission on Environmental Quality (TCEQ) asks that the United States Environmental Protection Agency (EPA) concur with its findings and exclude ozone measurements taken at the El Paso UTEP (CAMS 12) monitoring site from comparison to the 2015 eight-hour ozone National Ambient Air Quality Standard (NAAQS).

1.1 EL PASO CONCEPTUAL MODEL

El Paso, Texas, is located at the western-most extreme section of the state. El Paso and Ciudad Juarez, Mexico straddle the U.S.-Mexico international border and are immediately adjacent to each other. The population of El Paso is approximately 835,000 and the population of Ciudad Juarez is above 1.3 million. El Paso is also home to a major U.S. Army installation, Fort Bliss. The post is comprised of over 1.12 million acres of land, and the installation is home to over 38,500 active duty military personnel. Despite its increasing population and its proximity to Ciudad Juarez, El Paso has made significant progress in reducing ozone over the long term. Figure 1-1: *El Paso Area Annual Ozone Design Value 2000-2015*, shows that El Paso has improved its annual design value from 80 ppb to 71 ppb.

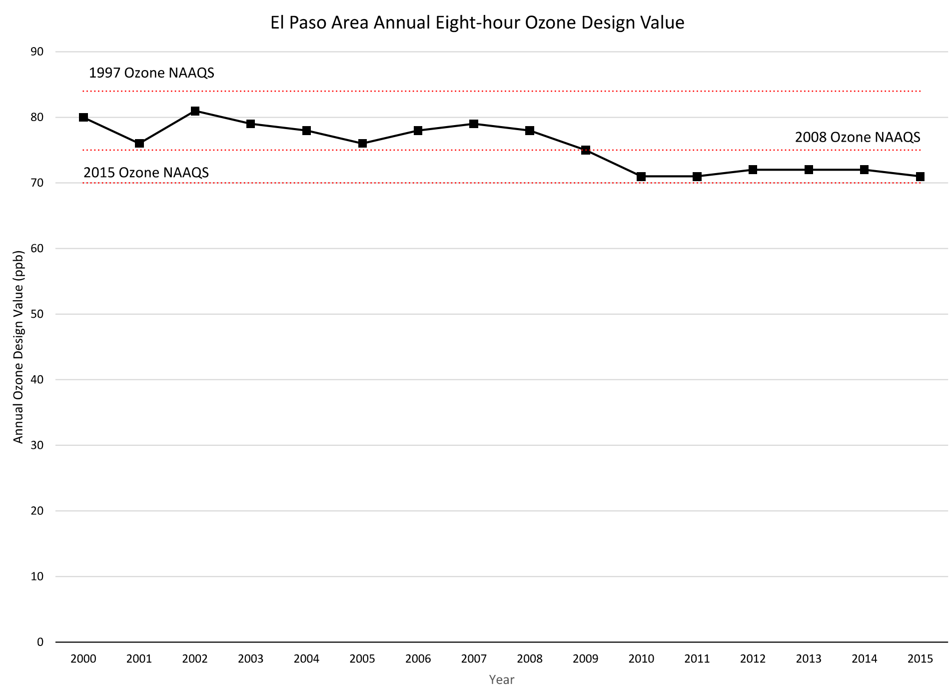

Figure 1-1: El Paso Area Annual Ozone Design Value 2000-2015

El Paso has a mountain range that divides the city into two parts, and Ciudad Juarez has a mountain range located south of the city. This mountainous topography influences wind flow in both cities. The Rio Grande River separates the two cities and creates a low point or valley between them that channels the wind and further influences wind flow around the city.

There are three major international ports of entry into El Paso – the Paso Del Norte, Stanton, and Zaragoza (Ysleta) bridges. The border crossings connect the two cities and represent the world's largest international border metropolitan area. According to El Paso's International Bridges Department, more than 3.6 million passenger vehicles, 4.2 million pedestrians, and 300,000 commercial vehicles cross into Ciudad Juarez each year.

In El Paso, mobile source emissions make up the majority nitrogen oxides (NO_X) emissions while mobile and area make up the majority of volatile organic compound (VOC) emissions. Figure 1-2*: El Paso County Total VOC and NOX Emissions*, shows that overall NO_X and VOC emissions have steadily decreased over the past 14 years. There is currently limited information regarding ozone precursors in Ciudad Juarez; however, historic NO_X inventories show a high percentage of mobile source emissions (Li, et. al., p. 6-39). Both cities are dominated by area and mobile source emissions, and Ciudad Juarez may have larger area and mobile source emissions because of population and fewer programs currently in place to control those sources.

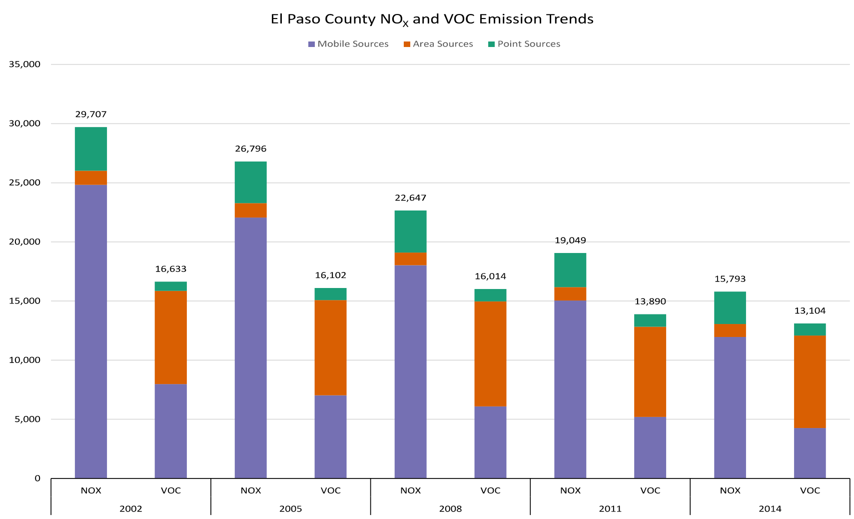

Figure 1-2: El Paso County Total VOC and NO_X Emissions

Past research has shown that high-ozone days in El Paso County are characterized by high solar radiation, high temperatures (above 85 degrees Fahrenheit), light winds, and wind directions from the south-southeast. Meteorological modeling indicates that ozone levels are correlated negatively with morning mixing heights and positively with afternoon mixing heights (Li, et. al., pp. 4-25 – 4-27).

High ozone days (maximum daily eight-hour average concentration greater than 70 ppb) in El Paso County generally occur May through September but have also been measured in April and as early as March. The most frequent months are June, August, and September. Maximum daily ozone concentrations usually occur near midday. The highest maximum daily ozone concentrations in the area tend to be measured along the Rio Grande river valley (the U.S./Mexico border) (Li, et. al., p. xix).

1.2 THE EL PASO UTEP (CAMS 12) MONITORING SITE

The El Paso UTEP (CAMS 12) monitoring site is located just north of downtown El Paso on the campus of the University of Texas at El Paso (See Figure 1-3: *Location of the El Paso UTEP (CAMS 12) Monitoring Site*). It has been active since January 1, 1981. Siting and instrumentation information for the El Paso UTEP (CAMS 12) monitoring site is shown in Table 1-1: *El Paso UTEP (CAMS 12) Monitoring Site Information*. The El Paso UTEP (CAMS 12) monitoring site has been the ozone design value monitor for the El Paso area since 2010.

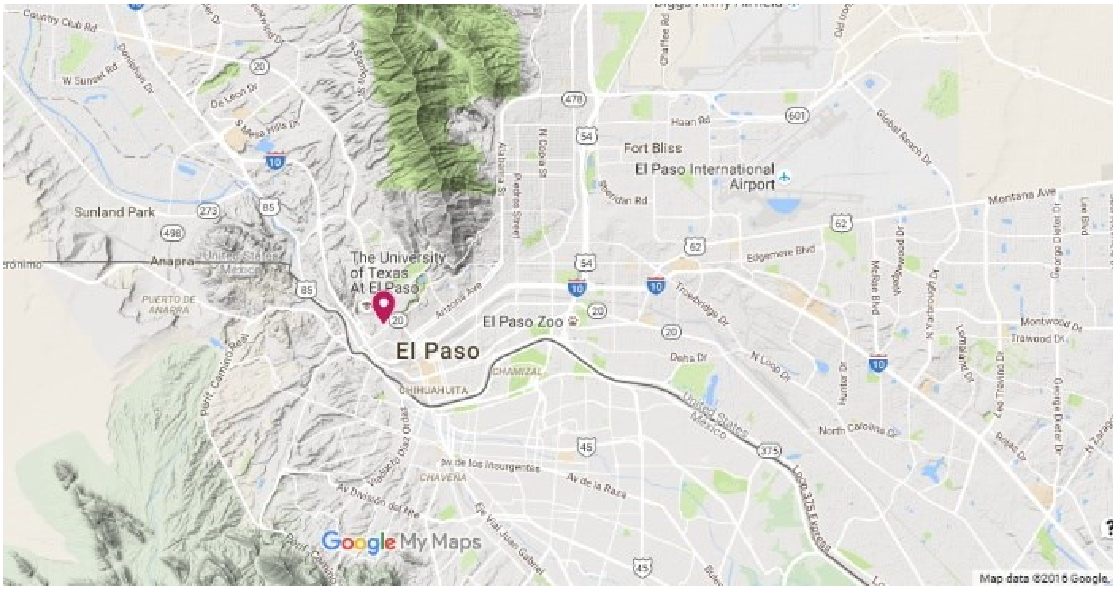

Figure 1-3: Location of the El Paso UTEP (CAMS 12) Monitoring Site

Table 1-1: El Paso UTEP (CAMS 12) Monitoring Site Information

El Paso UTEP Continuous Air Monitoring Site 12 (CAMS 12)
AQS Number: 481410037
Active Since: January 1, 1981
Address: 250 Rim Rd., El Paso, TX 79902
Lat/Lon: N 31.7682914 º W 106.5012595º
Elevation: 1158.0 meters
Instrumentation: pollutants - ozone, nitrogen oxides, sulfur dioxide, total suspended particles (lead), PM_{10} (TEOM), $PM_{2.5}$ (TEOM), $PM_{2.5}$ (FRM); meteorology – winds, outside temperature, dew point temperature, relative humidity, precipitation, solar radiation, ultraviolet radiation

1.3 FIRES RELATED TO JUNE 21, 2015 EXCEEDANCE IN EL PASO

Based on its analysis of Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model trajectories from various fires and the El Paso UTEP (CAMS 12) monitoring site, the TCEQ has identified a wildfire in Arizona as the a contributing cause of the June 21, 2015, ozone exceedance at the El Paso UTEP (CAMS 12) monitoring site. The Hog fire started from a lightning strike early on June 17, 2015. It was located in the Coronado National Forest (Douglas Ranger District) very close to the Arizona-New Mexico border. The fire's location is approximately 155 miles west of El Paso. By the end of the fire on June 25, 2015, it had burned approximately 8,000 acres of grass, brush, and mesquite (National Wildfire Coordination Group, 2015). The TCEQ believes that several other fires further north and west in Arizona may have also contributed to the maximum daily eight-hour average ozone concentration of 77 ppb measured at the El Paso UTEP (CAMS 12) monitoring site on June 21, 2015. Additional information regarding these fires can be found in Table 1-2: *Fires Contributing to El Paso Exceptional Event*. Approximate geographic locations can be found in Figure 1-4: Geographic Location of Fires Contributing to El Paso Exceptional Event.

Table 1-2: Fires Contributing to El Paso Exceptional Event

Fire Name	Location (Lat/Lon)	Size (acres)	Cause	Start Date	End Date
Primary Fire					
Hog Fire	N 31.503 º W 109.089 º	8,000	Lightning	6/17/2015	6/25/2015
Contributing Fires					
Whitetail Complex	N 33.574 º W 110.246 º	33,633	Lightning	6/16/2015	6/29/2015
Sawmill	N 33.507 º W 109.932 º	5,667	Lightning	6/17/2015	6/29/2015
Kearny River	N 33.050º W 110.917 º	1,428	Human	6/17/2015	6/27/2015
Saguaro	N 32.340 º W 109.784 º	119	Human	6/18/2015	6/20/2015

In the following chapters, the TCEQ will show that the Hog fire, with contributions from at least four other fires, caused the measured exceedance of the 2015 eight-hour ozone NAAQS of 0.070 parts per million. The TCEQ will also show that this event meets the requirements of the exceptional events rule. Based on this demonstration, the TCEQ requests that the EPA concur with the TCEQ's findings.

Figure 1-4: Geographic Location of Fires Contributing to El Paso Exceptional Event

CHAPTER 2: EXCEPTIONAL EVENT REQUIREMENTS FOR STATES

2.1 RELEVANT REGULATORY DOCUMENTS

There are four notable regulatory activities by the United States Environmental Protection Agency (EPA) that address exceptional event demonstration requirements:

- the 2007 Exceptional Events Rule (EER);
- the proposed 2015 revisions to the 2007 EER;
- the draft *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations;* and
- the EPA Memorandum, Area Designations for the 2015 Ozone National Ambient Air Quality Standards.

2.2 REQUIREMENTS FOR AN EXCEPTIONAL EVENT

On March 22, 2007, the EPA published the EER which provided a process that allowed states to request that the EPA exclude monitoring data showing exceedances or violations of a criteria pollutant National Ambient Air Quality Standard (NAAQS) directly related to an exceptional event (72 Fed. Reg. 13560 March 22, 2007). When a state identifies a possible exceptional event, it places a "flag" in the appropriate field of the data record in question for informational purposes. Prior to July 1 of the year following a state's placement of the informational flag, it must inform the EPA of the flag and provide some initial reason for its placement. From that point, a state has three years after the quarter in which the flagged data were reported to the EPA to submit (after notice and opportunity for public comment) a demonstration package to the EPA showing the reasons that the event should be considered exceptional. If the EPA is satisfied with the state's demonstration package, it places a concurrence flag in the appropriate field and record in the Air Quality System (AQS) database.

The EER specifies at 40 Code of Federal Regulations (CFR) §50.14(c)(3)(iv) that states wanting to exclude monitoring data from consideration based on exceptional events must provide evidence that:

- The event satisfies criteria set out in the definition of exceptional event (40 CFR §50.1(j));
- There is a clear causal relationship between the measurement under consideration and the event;
- The event is related to a measured concentration in excess of normal historical fluctuations;
- There would have been no exceedance but for the event; and
- The public comment process was followed.

The EPA defines "exceptional event" in the EER (40 CFR §50.1(j)) 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 a natural event, and is determined by the Administrator to be an exceptional event.

Additionally, the EER (40 CFR §51.930) requires that a state requesting a concurrence on an exceptional event day must take "appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards." A state, at a minimum, must:

- Provide for prompt public notification when air quality concentrations are expected to exceed a criteria NAAQS.
- Provide for public education regarding actions that individuals may take to reduce exposure to unhealthy levels of the pollutant during and following an event.
- Provide for implementation of appropriate measures to protect health from exceedances of criteria NAAQS caused by exceptional events.

2.3 PROPOSED CHANGES TO EXCEPTIONAL EVENTS POLICIES

On November 20, 2015, the EPA proposed revisions to the 2007 EER and announced the availability for public comment of a draft guidance document that applies the proposed rule revision to wildfire events that could influence monitored ozone concentrations (80 Fed. Reg. 72839 November 20, 2015). Highlights of the proposal include:

- more clearly defining the scope of the EER to apply only to certain types of regulatory actions;
- revising the rule language to more closely align with the language in the FCAA;
- removing the requirement for states to show that there would have no exceedance or violation but for the event;
- relying on SIP controls to satisfy the “not reasonably controllable or preventable” criterion provided the EPA has approved the SIP within the last five years;
- clarifying the analyses, content, and organization for exceptional events demonstrations;
- requiring an initial notification by the state to the EPA of a potential exceptional events request;
- removing the specific deadlines that apply in situations other than initial area designations following promulgation of a new or revised NAAQS; and
- clarifying fire-related definitions and demonstration components.

The EPA stated its intent to finalize these rule revisions before October 1, 2016, which is the date by which states, and any tribes that wish to do so, are required to submit their initial designation recommendations for the 2015 eight-hour ozone NAAQS. At the same time the EPA announced the availability for public comment of the draft *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* (EPA, November 10, 2015). The EPA anticipated finalizing the guidance on the same schedule as the revised rule making. The draft guidance includes example analyses, conclusion statements, and technical tools that air agencies can use to provide evidence that a wildfire event influenced a monitored ozone concentration(s). In particular the guidance identifies characteristics (e.g., season of occurrence, fire emissions, the fire’s distance from the ozone monitor, and how high ozone levels reached during the fire) that could enable an air agency to submit a simpler and less resource-intensive demonstration package.

On February 25, 2016, the EPA released a memorandum, *Area Designations for the 2015 Ozone National Ambient Air Quality Standards* (EPA, February 25, 2016). The purpose of the memorandum is to provide information on the schedule and process for initially designating areas for the purpose of implementing the 2015 primary and secondary eight-hour ozone NAAQS. The memorandum includes a discussion of exceptional events and designations.

2.4 EXCEPTIONAL EVENTS AND DESIGNATIONS

When certain criteria are met, the FCAA and the EPA’s implementation regulations specified in the EER allow for the exclusion of air quality monitoring data from design value calculations when there are exceedances caused by exceptional events. Excluding data influenced by an exceptional event affects initial area designations and nonattainment classifications for the 2015 eight-hour ozone NAAQS.

In the 2015 eight-hour ozone NAAQS final rule (80 Federal Register 65291 October 26, 2015), the EPA established schedules for air agencies to flag data influenced by exceptional events and submit related documentation for data that will be used in the initial designations process for the 2015 eight-hour ozone NAAQS. Although some of these deadlines are accelerated compared to the general schedule timelines in the 2007 EER, they were promulgated to align closely with the timing of the initial designation recommendations from states and tribes in October 2016 and/or the EPA expected issuance of 120-day letters pertaining to designation by June 2017. "These schedules reflect the EPA's interests in ensuring that we can fully consider exceptional events claims that could influence the final designations [*sic*] decisions."

The EPA memo of February 25, 2016, encourages regional offices to work with states and tribes with exceptional events claims to prioritize and expedite the demonstration development and review process for those claims that have the potential to influence regulatory decisions, such as the initial designations process. Attachment 2 of this memo provided the schedule for documentation submissions and is shown in Table 2-1: *Revised Schedule for Exceptional Event Submissions*.

Table 2-1: Revised Schedule for Exceptional Event Submissions

Air Quality Data Collected for Calendar Year	Event Flagging & Initial Description Deadline	Detailed Documentation Submission Deadline
2013, 2014, 2015	July 1, 2016	October 1, 2016
2016	May 31, 2017	May 31, 2017

The proposed 2015 EER revision and accompanying guidance have not been finalized. On June 23, 2016, the EPA delivered a draft final rule for review by the Office of Management and Budget. Based on consultation with EPA Region 6, the TCEQ was advised to develop this technical demonstration based on rules and guidance currently in place. The detailed documentation submission deadline of October 1, 2016, makes it necessary for the Texas Commission on Environmental Quality (TCEQ) to follow the 2007 EER and guidance in developing this demonstration.

2.5 RESPONSES TO EXCEPTIONAL EVENT RULE REQUIREMENTS

The following section summarizes the TCEQ's adherence to the EER guidance and presents the necessary evidence and additional information to support flagging ozone data at the El Paso UTEP (CAMS 12) monitoring site as impacted by an exceptional event on June 21, 2015. Consistent with the interim guidance of 2013 (EPA, 2013, p. 2), the TCEQ relies on a weight of evidence approach for its demonstration. As the EPA notes in the guidance (U.S. EPA, 2013, p. 2), the different requirements are inter-related, and thus, sections of this demonstration may support more than one requirement and may refer to other sections of the demonstration package. Chapter 3: The Exceedance of June 21, 2015, of this document provides a more detailed demonstration of how data from June 21, 2015 meet the rule requirements that:

- the event is related to a measured concentration in excess of normal historical fluctuations;
- there is a clear causal relationship between the measurement under consideration and the event; and
- there would have been no exceedance but for the event.

The event under consideration is the wildfire-induced exceedance of the 2015 eight-hour ozone NAAQS measured at the El Paso UTEP (CAMS 12) monitoring site on June 21, 2015. Consequently, the TCEQ is submitting this event as an exceptional event under the 2015 ozone NAAQS.

When the EPA published the final version of the EER on March 22, 2007, (72 Fed. Reg. 13569 March 22, 2007) it noted in the preamble that:

> "The final rule permits a case-by-case evaluation, without prescribed threshold criteria, to demonstrate that an event affected air quality. The demonstration would be based on the weight of available evidence, but must consider the historical frequency of such measured concentrations. While a State may determine the specific approach to use for such analysis, it must compare contemporary concentrations with the distribution of all measured data during the past several years."

The June 21, 2015, event did affect air quality as evidenced by the observations detailed in this demonstration. First, the event occurring on this day was well outside the normal historical fluctuations of recent monitored values. The maximum eight-hour average ozone concentration at the El Paso UTEP (CAMS 12) monitoring site on this day was 77 parts per billion (ppb). As demonstrated in Figure 3-3: *Percent Rank of June 21, 2015, based on Year-round Data*, and Figure 3-4: *Percent Rank of June 21, 2015, based on Ozone Season Data*, this maximum ranks above the 99th percentile when considering the population of maximum daily eight-hour measurements for a contemporary period of 2010 through 2015, which contains over 700 days at this monitoring site (EPA, 2013, p.5). The Hog fire in southeastern Arizona produced significant amounts of ozone precursors. Winds transported these emissions to the El Paso UTEP (CAMS 12) monitoring site and caused ozone levels that were well outside the normal historical fluctuation of ozone values at the El Paso UTEP (CAMS 12) monitoring site. Second, the fire caused the day's maximum eight-hour ozone average concentration for June 21, 2015 to climb above the 2015 eight-hour ozone NAAQS. Using a weight of evidence approach, the TCEQ will show a causal relationship between the Hog fire and ozone concentrations measured at the El Paso UTEP (CAMS 12) monitoring site. The TCEQ will also demonstrate that this event affected air quality at the monitoring site by creating an exceedance of the 2015 ozone NAAQS and higher ozone concentrations than would have been experienced without the transported wildfire emissions.

2.6 THE EVENT IS NOT REASONABLY CONTROLLABLE OR PREVENTABLE

Having occurred outside of the State of Texas, these fires were not controllable or preventable by Texas.

2.7 THE EVENT IS NOT LIKELY TO RECUR OR IS NATURAL

The primary fire determined to have caused the subject ozone exceedance was started by a natural cause: lightning strike. Two of the additional fires (Kearney River and Saguaro) were caused by human activity. Once an area has been burned out, the likelihood of that area burning again declines for an extended period (assuming that the fire was completely extinguished), and the biomass available to burn is significantly reduced such that a fire in the same area in the next several years would likely yield significantly fewer emissions. Any of the fires attributable to human causes that occur outside of Texas are not controllable or preventable by the State of Texas.

2.8 THE TCEQ FOLLOWED THE PUBLIC COMMENT PROCESS

The TCEQ provided for stakeholders and the public to comment on this document for 30 days as required by federal rules. All comments received will be included in the final version of this demonstration package.

2.9 MITIGATION REQUIREMENTS OF 40 CFR §51.930

The EER (40 CFR §51.930) requires that "a State requesting to exclude air quality data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards." The TCEQ addresses each of the specific requirements individually below.

2.9.1 Prompt Public Notification

The first mitigation requirement is to "provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard." The TCEQ provided (and continues to provide) ozone, fine Particulate Matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and Particulate Matter less than or equal to 10 microns in diameter (PM_{10}) Air Quality Index (AQI) forecasts for the current day and the next three days for 14 areas in Texas including the El Paso area. These forecasts are available to the public on the Today's Texas Air Quality Forecast Web page of the TCEQ website (http://www.tceq.texas.gov/airquality/monops/forecast_today.html), and on the EPA's AIRNOW website (http://airnow.gov/). The TCEQ provides near real-time hourly ozone measurements from monitors across the state, including the El Paso area, which the public may access on the Current Ozone Levels page of the TCEQ website (http://www.tceq.texas.gov/cgi-bin/compliance/monops/select_curlev.pl). The TCEQ also publishes an AQI Report for a number of Texas metropolitan areas including the El Paso area on the AQI page of the TCEQ website (http://www.tceq.state.tx.us/cgi-bin/compliance/monops/aqi_rpt.pl), which displays current and historical daily AQI measurements. Finally, the TCEQ publishes daily updates to its air quality forecast to interested parties through electronic mail. Any person wishing to receive these updates may register on the TCEQ website (http://www.tceq.texas.gov/airquality/monops/ozone_email.html). These measures provide daily and near real-time notification to the public of current, expected, and changing air quality conditions.

2.9.2 Public Education

The second mitigation requirement is to "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." Through its website, the TCEQ provides the public with technical, health, personal activity, planning, and legal information and resources concerning ozone pollution.

> The TCEQ maintains an ozone fact sheet (http://www.tceq.texas.gov/airquality/monops/ozonefacts.html), which provides important information regarding the health effects of ozone, steps that individuals can take to limit ozone formation, and actions they may wish to take to reduce their exposure to higher levels of ozone. A hyperlink to this fact sheet is located on the TCEQ daily air quality forecast page. The fact sheet points individuals towards additional health-related information from the Centers for Disease Control, the Texas Department of State Health Services, and the EPA.

The TCEQ's main Web page for air (http://www.tceq.texas.gov/agency/air_main.html) provides air quality information on topics such as advisory groups, emissions inventories, air quality modeling and data analysis, scientific field studies, state implementation plans (SIP), air permits, rules, air monitoring data, and how to file complaints.

The TCEQ provides a specific "Air Pollution from Ozone" Web page (http://www.tceq.texas.gov/airquality/sip/criteria-pollutants/sip-ozone), which provides the latest information on air quality planning activities by both the TCEQ and the EPA.

The TCEQ's website provides a hyperlink to the Texas "AirNow" website operated by the EPA (http://www.airnow.gov/index.cfm?action=airnow.local_state&stateid=45&tab=0). This website links the public to additional information regarding health effects of ozone, strategies for reducing one's exposure to ozone, and actions that individuals can take to reduce pollution levels.

The Texas Department of Transportation sponsors the public education and awareness campaign, "Drive Clean Across Texas" (http://www.drivecleanacrosstexas.org). The campaign raises awareness about the impact of vehicle emissions on air quality and motivates drivers to take steps to reduce air pollution. The campaign's activities are concentrated during the summer months when ozone levels rise.

The TCEQ sponsors the "Take Care of Texas" program (http://takecareoftexas.org/air-quality), which addresses air quality and provides the public with proactive steps to reduce air pollution particularly on days when air quality forecasts are issued predicting greater potential for ozone formation.

2.9.3 Implementation of Measures to Protect Public Health

When dealing with exceptional events originating from outside of Texas (e.g., the case of June 15, 2015), there is very little that the TCEQ can do to mitigate the impact of additional ozone created by the exceptional event. The City of El Paso is nonattainment for PM_{10} and the TCEQ has adopted a SIP (TCEQ, 2012) to improve PM_{10} levels in the city. Because the El Paso area was previously an ozone and carbon monoxide nonattainment area, the TCEQ has implemented a maintenance plan approved by the EPA (TCEQ, 2006B). The maintenance plan includes measures such as a low Reid Vapor Pressure gasoline program, an inspection and maintenance program, the Texas Emissions Reduction Program, and 30 Texas Administrative Code Chapter 115 rules for the control of VOC emissions from stationary sources (TCEQ, 2006B), (TCEQ, 2006A), and (TCEQ, 2008). More detailed information about the state's ozone reduction strategies can be found on the following Web pages:

Control Strategies for Stationary Sources: http://www.tceq.texas.gov/airquality/stationary-rules/ozone

Control Strategies for On-Road Mobile Sources: http://www.tceq.texas.gov/airquality/mobilesource/mobile_source.html

Air Permitting: http://www.tceq.texas.gov/permitting/air

Texas Emissions Reduction Plan Program: http://www.tceq.texas.gov/airquality/terp/erig.html

2.10 A CLEAR CAUSAL RELATIONSHIP EXISTS

Scientific consensus exists that emissions from fires can increase ozone levels downwind of the fire area. The TCEQ provides ample scientific evidence of a causal relationship in this package.

Using a combination of ground-based measurements, meteorological modeling, and satellite imagery, the TCEQ will demonstrate that the Hog fire did cause the measured exceedance on June 21, 2015. The analyses will clearly show that an ozone plume containing pollutants associated with fires passed through the area surrounding the El Paso UTEP (CAMS 12) monitoring site on June 21, 2015, and that the plume was transported from the Hog fire in Arizona.

2.11 IN EXCESS OF NORMAL HISTORICAL FLUCTUATIONS

Although the EPA has not precisely defined when a measured concentration is "in excess of normal historical fluctuations," the 77 ppb ozone average observed at the El Paso UTEP (CAMS 12) monitoring site on June 21, 2015, is clearly in excess of normal fluctuations. The daily maximum eight-hour ozone concentration measured on June 21, 2015, exceeds the 99th percentile of data from the seven-month ozone season in El Paso over a six-year period. The same day's maximum eight-hour ozone average concentration also exceeds the 99th percentile of data on a 12 month basis over the same six-year period. (See Figure 3-3: *Percent Rank of June 21, 2015, based on Year-round Data* and Figure 3-4: *Percent Rank of June 21, 2015, based on Ozone Season Data*)

2.12 THERE WOULD HAVE BEEN NO EXCEEDANCE BUT FOR THE EVENT

Using a surrogate day analysis, the TCEQ will show that without the transported emissions of the Hog fire in Arizona, the exceedance of June 21, 2015, would not have occurred. The surrogate day analysis compares June 26, 2011, to June 21, 2015. These two days are very similar except for the presence of significant transported fire emissions on June 21, 2015. The lack of an exceedance on a day that is very similar to June 21, 2015, in terms of meteorology and local emissions provides powerful evidence that without emissions from the fires an ozone exceedance would not have occurred.

CHAPTER 3: THE EXCEEDANCE OF JUNE 21, 2015

3.1 PERIOD OF ANALYSIS

When considering the amount of data that should be included in a technical demonstration, the Environmental Protection Agency (EPA) (2013, p. 5) notes that "For seasonal comparisons, the EPA recommends using all available seasonal data from 3-5 years (or more, if available)." For this exceptional event demonstration, the TCEQ has chosen to use a six-year period running from 2010 through 2015. The TCEQ did not use data from 2016 because this year is not yet complete. Avoiding the use of partial years or ozone seasons prevents a partial year or season from introducing a bias into the analysis results. From 2008 through 2010, El Paso's ozone design value dropped from 78 parts per billion (ppb) to 71 ppb (See Figure 1-1: *El Paso Area Annual Ozone Design Value 2000-2015*). This rapid drop in design value indicates a significant change in El Paso's air quality. It also signals that data from years prior to 2010 come from a period of time that is very different from El Paso's current air quality situation. That data would not be representative of the context in which the events of June 21, 2015, occurred. In short, using earlier data would introduce a bias into analytical results obtained by the TCEQ and, therefore, it would be scientifically indefensible to do so.

All ground monitoring data used in this demonstration package was obtained from the Texas Air Monitoring Information System (TAMIS).

3.2 THE RELATIONSHIP OF OZONE AND $PM_{2.5}$

In a previous ozone exceptional event demonstration, the TCEQ submitted a chart depicting co-located measurements of ozone and Fine Particulate Matter ($PM_{2.5}$) that rose and fell together over the course of several hours. The EPA commented on this information, noting that:

> "The package shows hourly $PM_{2.5}$ and ozone concentrations rising at the same time (Figure 4-4), but does not contrast this behavior with a day that is not believed to be impacted by fire events. The coincident timing of the $PM_{2.5}$ and ozone is not an unusual result because under stagnant conditions both pollutants should rise at the same time." (EPA, September 18, 2015, p. 4).

In preparing this demonstration, the TCEQ reviewed all 31 exceedance days at the El Paso UTEP (CAMS 12) monitoring site that occurred during 2010 through 2015. On a typical day, the diurnal profiles of ozone and $PM_{2.5}$ are almost mirror images of one another (see Figure 3-1: *El Paso UTEP (CAMS 12) Average Ozone and PM2.5 Diurnal Profiles*). When ozone is increasing in mid-day, $PM_{2.5}$ is usually decreasing and when $PM_{2.5}$ is increasing during the morning and afternoon traffic periods ozone is usually decreasing. On ozone exceedance days the meteorology is, by definition, ozone-conducive. Given EPA's statement, one would expect that $PM_{2.5}$ would break with the usual pattern and rise and fall with ozone (especially when winds were light). Time after time, however, $PM_{2.5}$ and ozone maintained their mirror image relationship, and $PM_{2.5}$ measurements tended to follow their normal diurnal pattern. On June 21, 2015, $PM_{2.5}$ rose and fell with ozone at a time of the day when $PM_{2.5}$ is normally decreasing (one of only three cases where this happens on an exceedance day). In five additional cases, $PM_{2.5}$ measurements deviated from their typical diurnal profile without following ozone closely. Therefore, the TCEQ concludes that co-located measurements of pollutants rising and falling together can be evidence that supports a clear causal relationship between fires and increased ozone. See Appendix A: *A Review of El Paso UTEP (CAMS 12) Monitoring Site Exceedance Days*, for $PM_{2.5}$, ozone, and average wind speed measurements for the exceedance days reviewed.

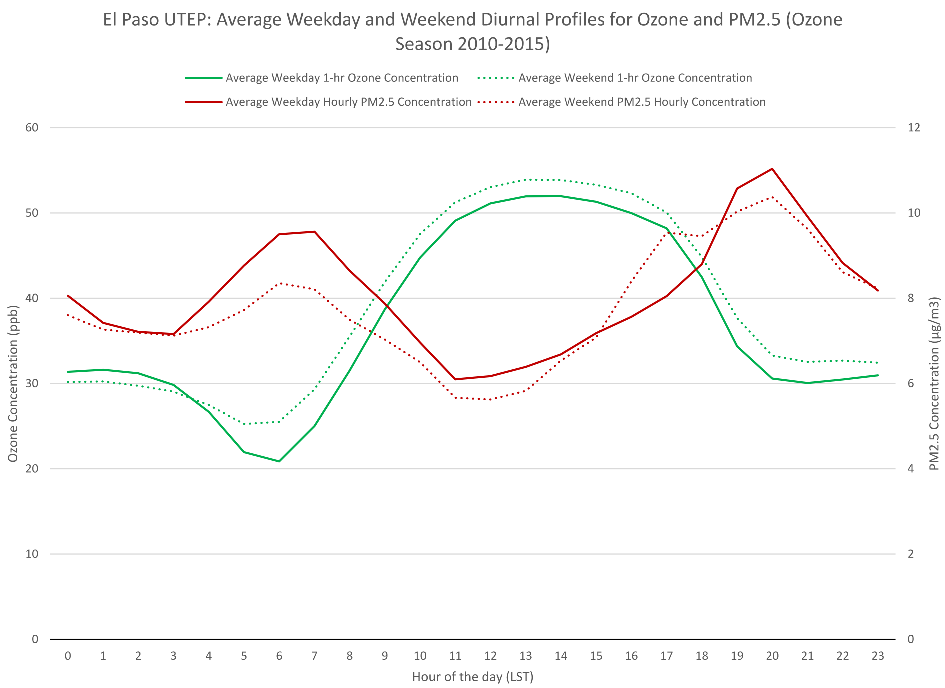

Figure 3-1: El Paso UTEP (CAMS 12) Average Ozone and $PM_{2.5}$ Diurnal Profiles

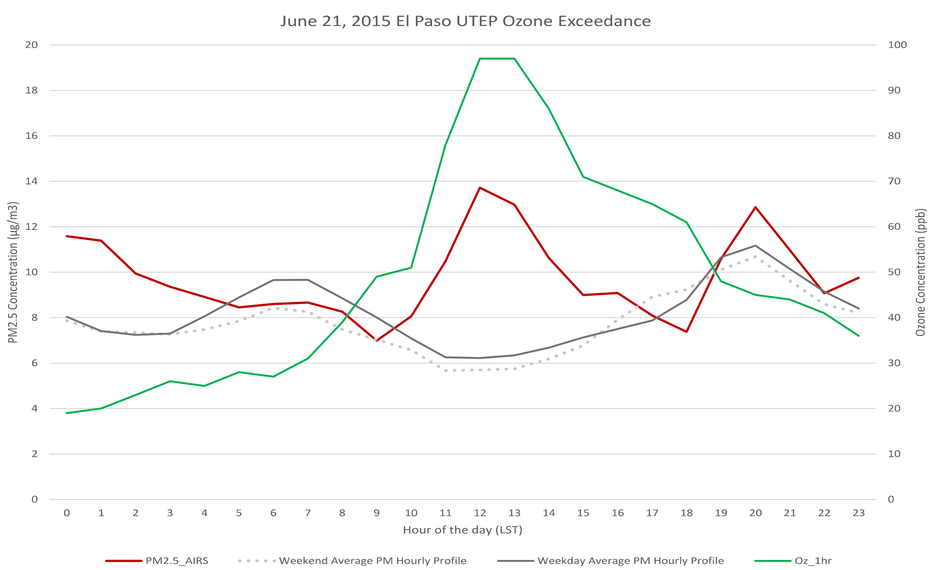

Figure 3-2: Ozone and $PM_{2.5}$ Measurements at El Paso UTEP on June 21, 2015

While the presence of elevated $PM_{2.5}$ measurements that correspond to rising and falling ozone measurements are consistent with the ozone and $PM_{2.5}$ having a common origin, it should be remembered that it is ultimately not $PM_{2.5}$ but other wildfire emissions and their reaction products that determine ozone production in a plume. Recent studies (Jaffe, et. al., 2013B) (Widger, et. al., 2013) of the impact of wildfires on ozone concluded that ozone and Particulate Matter (PM) enhancements from wildfires show little relationship. This situation is likely to arise out of ozone's complex chemistry (Jaffe, et. al., 2013). This means that ozone levels in a wildfire plume may be enhanced even though visible indicators of fire, such as smoke, are not visible.

3.3 REGULATORY IMPORTANCE

The Hog Fire event has regulatory importance because the EPA's concurrence with this demonstration would prevent the El Paso area from being designated under the 2015 eight-hour ozone NAAQS. As of August 19, 2016, the 2016 El Paso UTEP (CAMS 12) (and the El Paso area's) ozone design value stands at 71 ppb. If the EPA concurs with this demonstration then the El Paso area 2016 ozone design value would drop to 70 ppb. Table 3-1: *El Paso Area Ozone Design Value Comparison*, shows the comparison between approval and non-approval of the exceptional event day.

Table 3-1: El Paso Area Ozone Design Value Comparison

	2014	2015	2016
First High	75 ppb	81 ppb	78 ppb
Second High	73 ppb	77 ppb	78 ppb
Third High	72 ppb	74 ppb	72 ppb
Fourth High	70 ppb	72 ppb	71 ppb
Fifth High	69 ppb	70 ppb	69 ppb
Ozone DV without Exceptional Event		71 ppb	
Ozone DV with Exceptional Event		70 ppb	

3.4 CAUSE OF THE HOG FIRE IN ARIZONA

According to the National Wildfire Coordination Group (http://inciweb.nwcg.gov/incident/4303/) the Hog fire started on June 17, 2015, and was caused by a natural event, namely, a lightning strike. Because the fire occurred outside of Texas, the State of Texas had no ability to prevent or control the fire.

3.5 THE EVENT WAS NOT REASONABLY CONTROLLABLE OR PREVENTABLE

Because the fire occurred outside of Texas, and was caused by a natural event, the State of Texas had no ability to prevent or control the Hog fire.

3.6 THE EVENT WAS IN EXCESS OF NORMAL HISTORICAL FLUCTUATIONS

The maximum daily eight-hour ozone average concentration of 77 ppb measured at the El Paso UTEP (CAMS 12) monitoring site was truly outside of normal historical fluctuations. Figure 3-3: *Percent Rank of June 21, 2015, based on Year-round Data* and Figure 3-4: *Percent Rank of June 21, 2015, based on Ozone Season Data* both provide evidence that the El Paso UTEP

(CAMS 12) monitoring site sees levels of 77 ppb very infrequently. In fact on both an annual and seasonal basis, June 21, 2015, ranks above the 99th percentile.

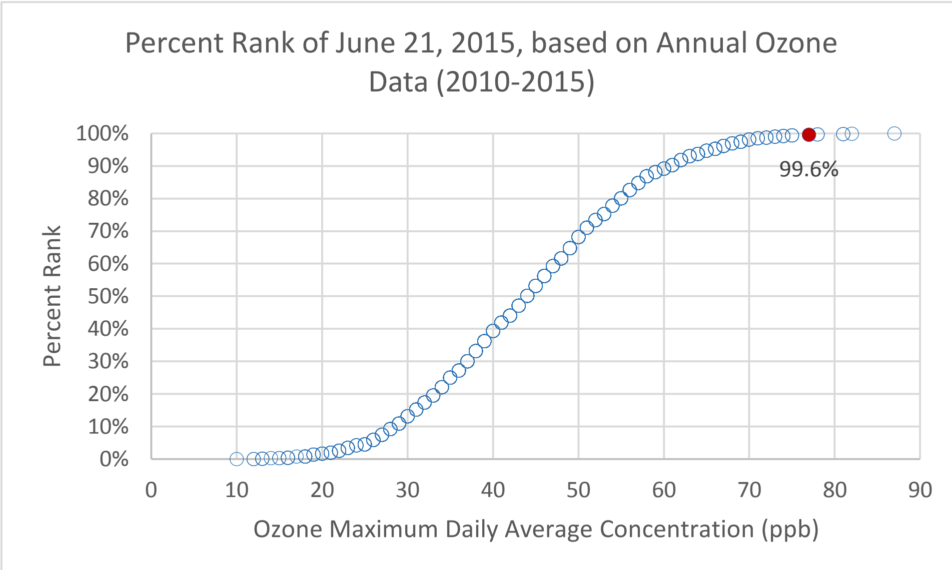

Figure 3-3: Percent Rank of June 21, 2015, based on Year-round Data

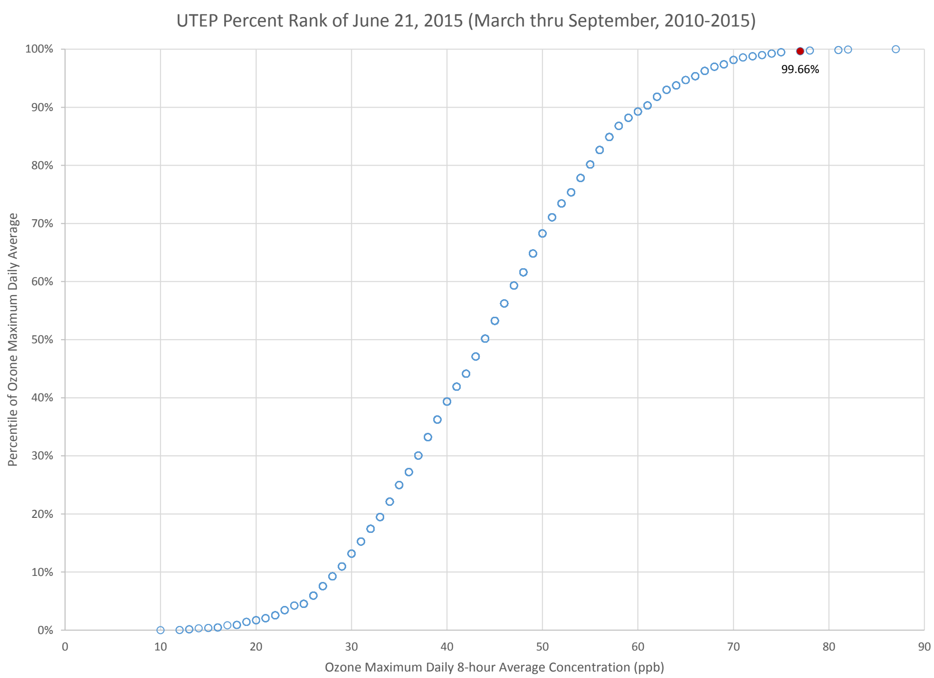

Figure 3-4: Percent Rank of June 21, 2015, based on Ozone Season Data

Although the El Paso UTEP (CAMS 12) monitoring site may, on rare occasions, see maximum ozone daily eight-hour averages of 77 ppb on days not significantly influenced by fires, the burden of proof upon the state is to demonstrate that the value is not really caused by *normal* historical fluctuation. An average in the top 0.4 percent of maximum daily eight-hour ozone averages is certainly not normal or routine. We agree with some of the recent EPA statements on exceptional event demonstrations. Specifically, its statement that "Air agencies should not be held accountable for exceedances due to exceptional events." (EPA, November 10, 2015, p.)

The goal of not holding states responsible for events outside their control is an important goal and is consistent with the EPA's EER.

3.7 A CLEAR CAUSAL RELATIONSHIP EXISTS AND AFFECTS AIR QUALITY

The EPA draft guidance states that, "Because plume elevation is not directly available from simple imagery, plume imagery alone does not conclusively show that fire emissions transported aloft reached a ground-level monitor. If plume arrival at a given location coincides with elevation of fire plume components (such as $PM_{2.5}$, CO or organic and elemental carbon), those two pieces of evidence combined can show that smoke was transported to the event location." (U.S. EPA, November 10, 2015, pp. 21-22).

Co-located measurements of ozone and $PM_{2.5}$ at the El Paso UTEP (CAMS 12) monitoring site clearly show that an ozone plume, accompanied by high levels of $PM_{2.5}$, consistent with wildfire emissions, passed over the El Paso UTEP (CAMS 12) monitoring site beginning at 11:00 AM (LST) of June 21, 2015. **Error! Reference source not found.** Figure 3-2: *Ozone and PM2.5 Measurements at El Paso UTEP on June 21, 2015*, shows the tight correspondence between the two pollutants and the significant deviation of $PM_{2.5}$ from its average diurnal pattern. As the EPA guidance quoted above indicates, this is a clear indication that the ozone plume originated from wildfire emissions. Also, as noted in Section 3.2: *The Relationship of Ozone and $PM_{2.5}$*, this correspondence does not arise because the meteorology on June 21, 2015, was conducive to high levels of ozone and $PM_{2.5}$.

The ozone plume that impacted the El Paso UTEP (CAMS 12) monitoring site was also observed at the El Paso Chamizal (CAMS 41) monitoring site, which observed high levels of carbon monoxide (CO) to be present with the ozone (also consistent with a plume that originated from wildfire emissions). The El Paso Chamizal (CAMS 41) monitoring site is 2.5 miles from the El Paso UTEP (CAMS 12) monitoring site. Like $PM_{2.5}$ at the El Paso UTEP (CAMS 12) monitoring site, CO measurements at the El Paso Chamizal (CAMS 41) monitoring site deviate from a typical diurnal pattern when the plume from the Hog fire appears in El Paso. Figure 3-5: *El Paso Chamizal (CAMS 41) CO and Ozone* , clearly shows that CO peaks at the same time as ozone when it would normally be at the bottom of a trough.

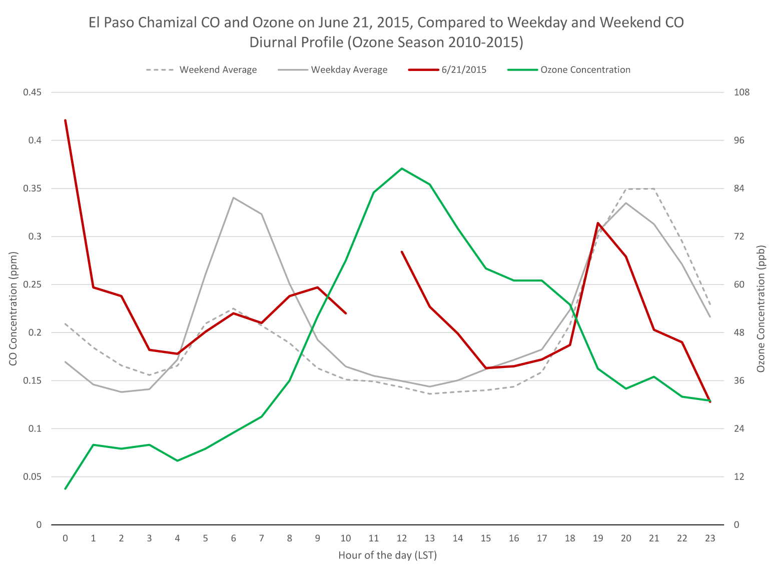

Figure 3-5: El Paso Chamizal (CAMS 41) CO and Ozone Measurements

Figure 3-6: *MODIS Imagery (Aqua Satellite) of AOD over El Paso on June 21, 2015*, shows a measurement of Aerosol Optical Depth (AOD) taken on the afternoon of June 21, 2015. AOD "indicates the level at which particles in the air (aerosols) prevent light from traveling through the atmosphere. Aerosols absorb and scatter incoming sunlight, which reduces visibility and increases the optical depth. An optical depth of less than 0.1 indicates a clear sky with maximum visibility, and a value of 1 indicates the presence of aerosols so dense that people would have difficulty seeing the Sun." A value of 0.4 indicates that El Paso is experiencing an elevated level of aerosol in its atmosphere. (NASA Worldview, http://go.nasa.gov/2bogMqv, July 18, 2016).

Figure 3-7: *AIRS Imagery (Aqua Satellite) of CO Over El Paso on June 21, 2015*, shows a daytime total column measurement of CO at 80-90 ppb over the El Paso area June 21, 2015 (NASA Worldview, http://go.nasa.gov/2bohdB9, July 18, 2016). The combination of satellite imagery and ground-based measurements shows (according to EPA guidance) that the pollutants not only reached the El Paso area, but also mixed down to ground level.

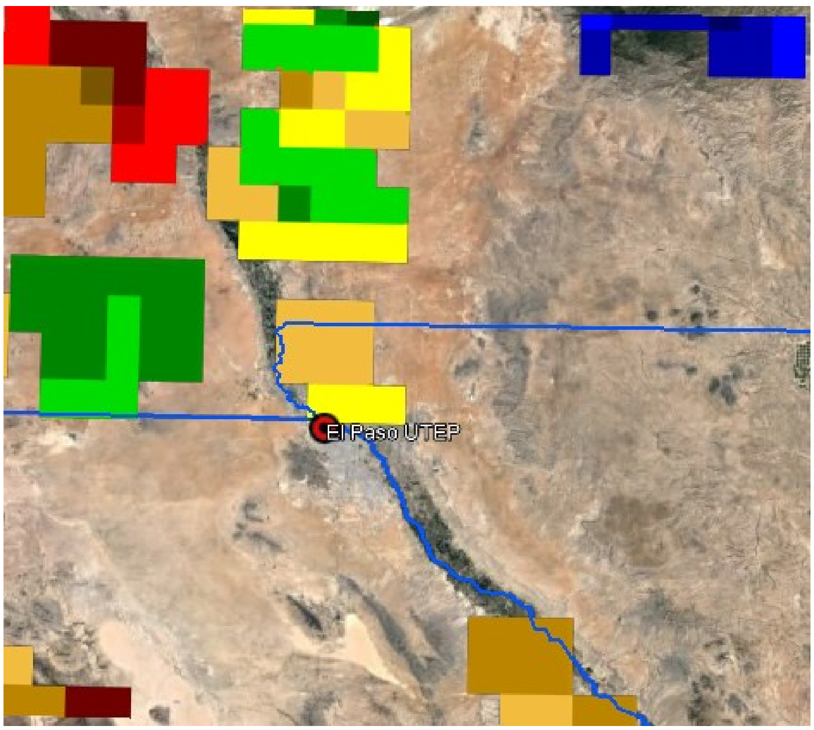

Figure 3-6: MODIS Imagery (Aqua Satellite) of AOD over El Paso on June 21, 2015

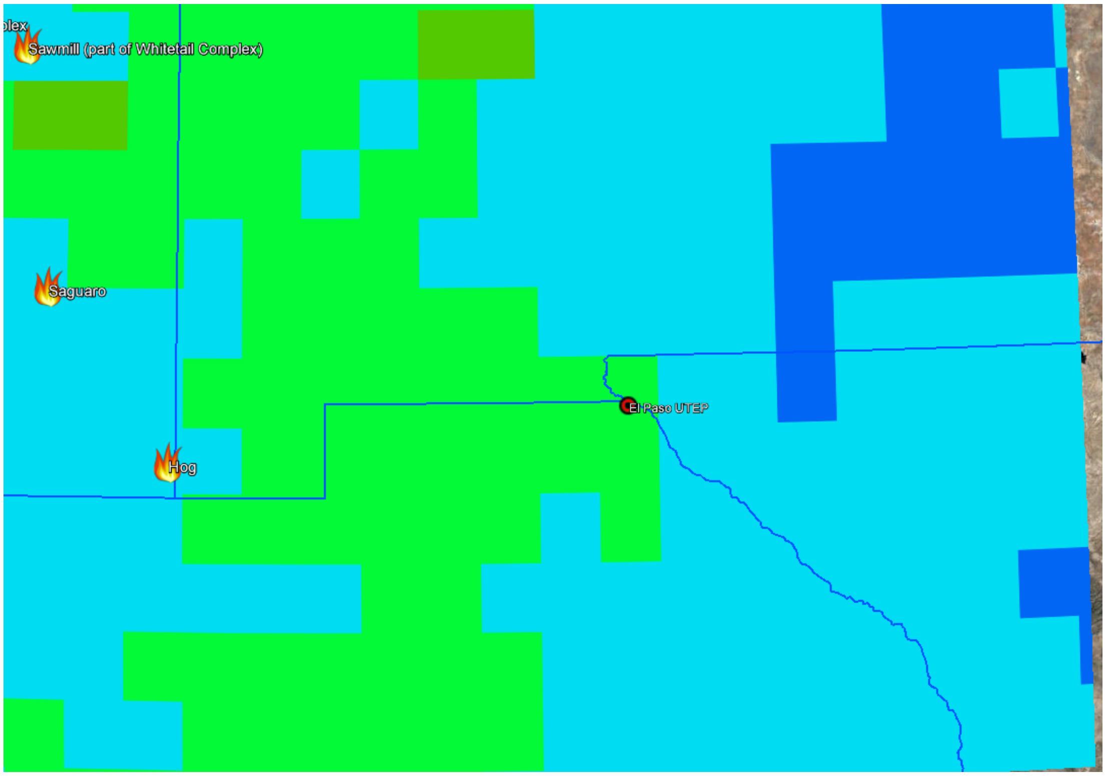

Figure 3-7: AIRS Imagery (Aqua Satellite) of CO Over El Paso on June 21, 2015

Air parcel trajectories created by the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) Model (Stein, *et. al*., 2015), developed by scientists at the National Oceanic and Atmospheric Administration (NOAA), were evaluated to determine if emissions from the fires were transported to El Paso at the time of the elevated ozone measurements. The TCEQ used the February 2016 release of the model with North American Regional Reanalysis (NARR) 32 kilometer wind fields. The TCEQ generated 18-hour backwards trajectories at heights of 100, 200, 300, and 400 meters (m) above ground level for every hour of the eight hours of the 11:00 to 18:00 (LST) averaging period plus similar trajectories for 12:30 and 13:30 PM (LST) (to represent the two peak hours of ozone measurements). After traveling about 155 miles, these trajectories consistently pass just to the north of the Hog fire location at heights between 250 and 450 m above ground level. In fact the distance between the trajectories and the fire location is about 20 miles (32 kilometers) which is only one cell width away from the Hog fire. Given the errors inherent to the HYSPLIT model, one grid cell difference between the Hog fire and back trajectories is accurate enough to believe that emissions from the Hog fire influenced ozone levels at the El Paso UTEP (CAMS 12) monitoring site. Likewise, the back trajectories would certainly have passed through smoke and emissions from the Hog Fire even if they did not literally pass over the top of the fire. The low level at which the trajectories pass over the fire area make entrainment of wildfire emissions a near certainty. Figure 3-8: *El Paso UTEP (CAMS 12) Back Trajectories for 1:30 PM (LST)*, shows a typical example of back trajectories originating at the El Paso UTEP (CAMS 12) monitoring site and passing very close to the Hog fire on June 21, 2015.

Figure 3-8: El Paso UTEP (CAMS 12) Back Trajectories for 1:30 PM (LST)

Forward HYSPLIT trajectories from the Hog fire (100, 200, 300, and 400 meters above ground level) consistently travel over the El Paso UTEP (CAMS 12) monitoring site at elevations ranging from less than 100 m to 500 m. These low altitudes over the El Paso UTEP (CAMS 12) monitoring site provide compelling evidence that the wildfire emissions mixed all the way down to the monitoring site and affected air quality. Figure 3-9: *Forward Trajectories from the Hog fire Arriving at the El Paso UTEP (CAMS 12) Site*, provides an excellent example of how close emissions from the Hog fire came to the El Paso UTEP (CAMS 12) monitoring site.

Figure 3-9: Forward Trajectories from the Hog fire Arriving at the El Paso UTEP (CAMS 12) Site

It is also likely that several other fires in Arizona contributed to the high ozone measurements at the El Paso UTEP (CAMS 12) monitoring site. Low level (200 meter above ground) forward trajectories (24 hours in length) also arrive in the El Paso area from Saguaro, Kearny River, Sawmill, and Whitetail Complex Fires. These trajectories were initiated at 11:00 AM (LST) and 12:00 PM (LST) on June 20, 2015 and arrive in the El Paso area just as the eight-hour averaging period is beginning on June 21, 2015. The elevation of these trajectories over the El Paso area ranged from 900m to 1000 m. Figure 3-10: *June 20, 2015, 11:00 AM (LST) Forward*

Trajectories from Arizona Fires, and Figure 3-11: *June 20, 2015, 12:00 PM (LST) Forward Trajectories from Arizona Fires*, show these trajectories reaching the El Paso area.

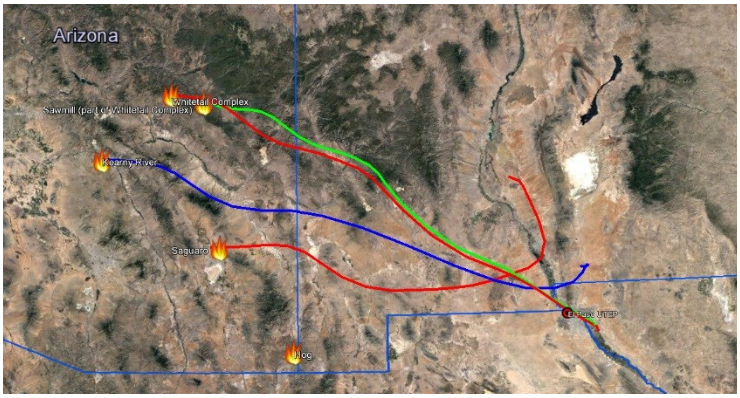

Figure 3-10: June 20, 2015, 11:00 AM (LST) Forward Trajectories from Arizona Fires

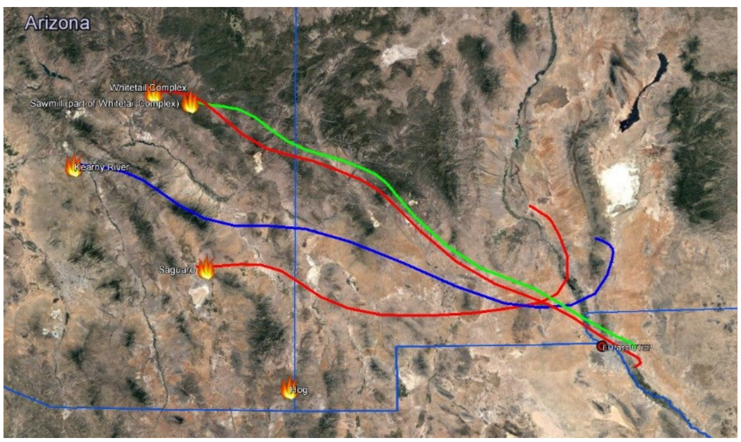

Figure 3-11: June 20, 2015, 12:00 PM (LST) Forward Trajectories from Arizona Fires

3.8 THERE WOULD HAVE BEEN NO EXCEEDANCE BUT FOR THE HOG FIRE

High pressure aloft centered over Arizona and New Mexico dominated the El Paso area on June 21, 2015. This high pressure resulted in abundant sunshine, temperatures over 100 degrees Fahrenheit and light winds. An inverted trough remained to the north and west of the area. Surface winds during the day were from the south-southeast as seen in the three-hour surface level back trajectory in Figure 3-12: *June 21, 2015, Three-hour Surface Back Trajectory from El Paso UTEP*. Figure 3-13: *Midday surface analysis for June 21, 2015*, shows the surface weather features on June 21, 2015.

Figure 3-12: June 21, 2015, Three-hour Surface Back Trajectory from El Paso UTEP

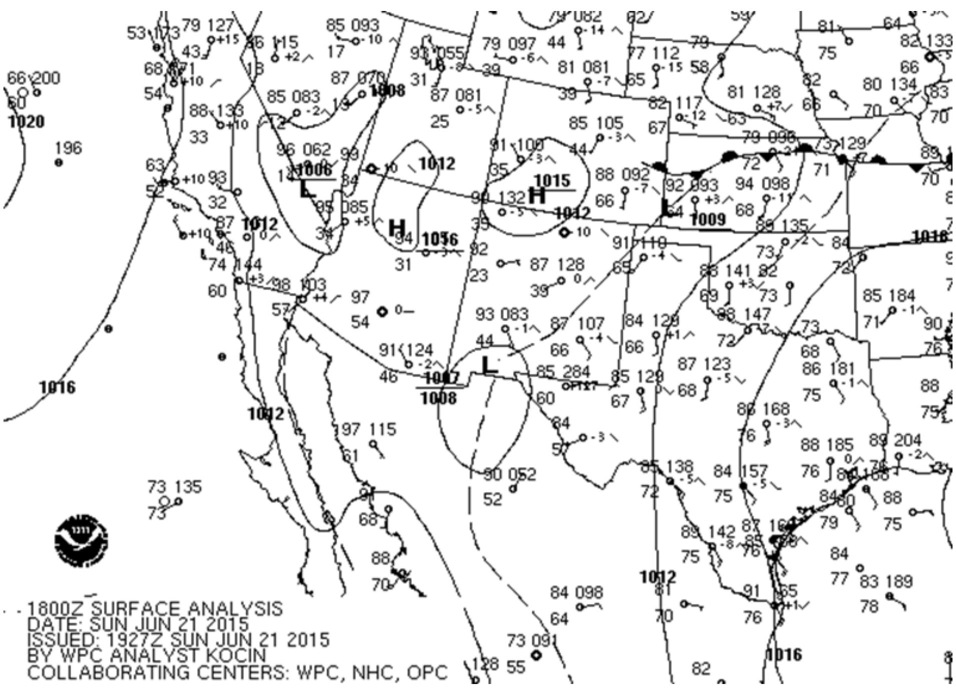

Figure 3-13: Midday surface analysis for June 21, 2015

Similar weather was present on June 26, 2011. High pressure aloft centered over the area resulted in subsidence and light winds in El Paso. The daily maximum temperatures in El Paso were above 100 degrees Fahrenheit. Figure 3-14: *June 26, 2011, Three-hour Back Trajectory from El Paso UTEP*, shows the three-hour surface back trajectory from the El Paso UTEP monitoring site on June 26, 2011. This shows a similar flow when compared to June 21, 2015 with surface winds coming from the south-southeast. The surface weather features on June 26, 2011, are shown in Figure 3-15: *Midday Surface Analysis for June 26, 2011*.

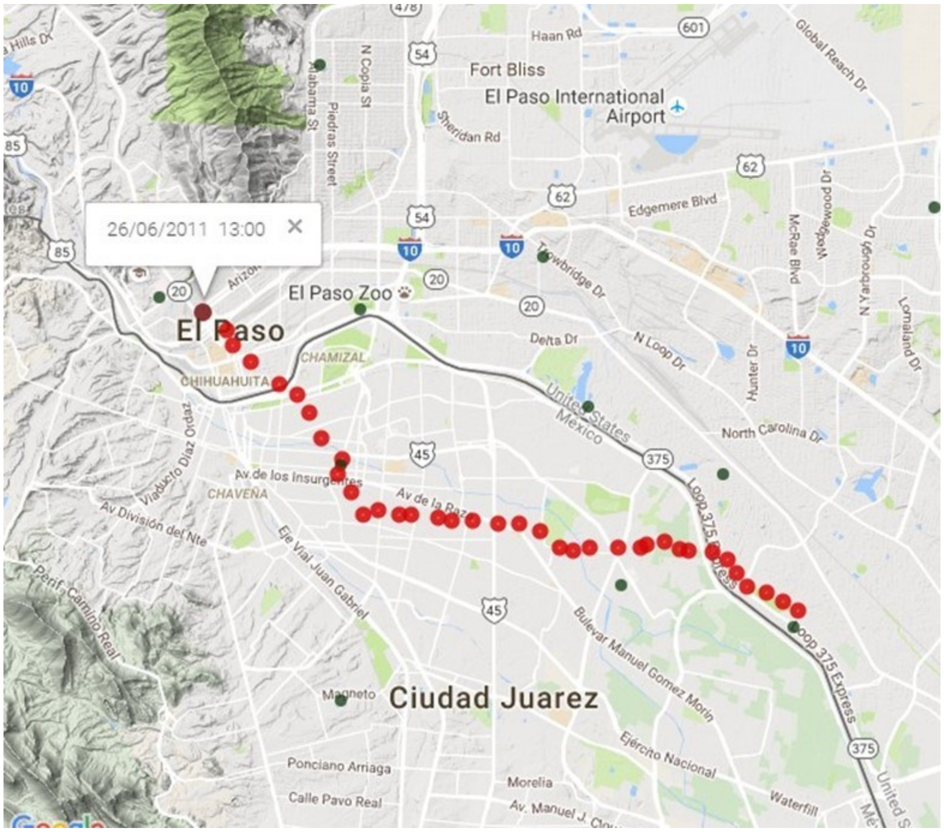

Figure 3-14: June 26, 2011, Three-hour Back Trajectory from El Paso UTEP

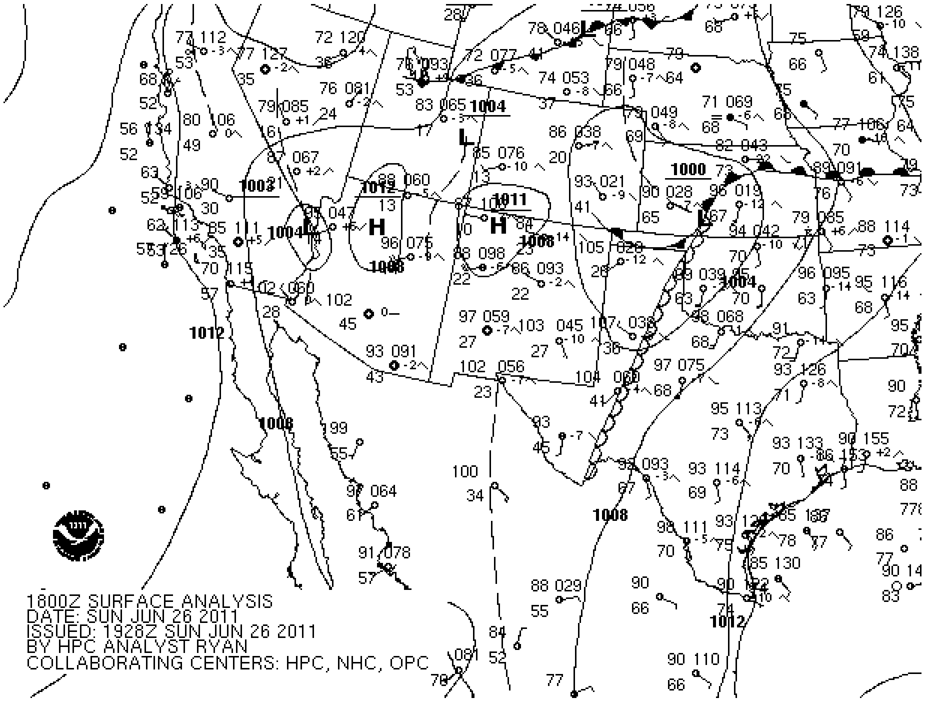

Figure 3-15: Midday Surface Analysis for June 26, 2011

Table 3-2: Surrogate Day Comparison

Parameter	June 21, 2015	June 26, 2011
Maximum Daily Eight-hour Ozone	77 ppb	70 ppb
Peak One-hour Ozone	97 ppb	79 ppb
Average Temperature*	99.4 °F	103.2 °F
Maximum Temperature	101.3 °F	104.7 °F
Maximum Solar Radiation	1.48 ly/min	1.37 ly/min
Average Wind Speed*	3.56 mph	5.78 mph
Average Relative Humidity*	9.2%	5.8%
Precipitation	0.00 in	0.00 in

*Parameters were averaged between 11:00 and 18:00 LST

Table 3-2: *Surrogate Day Comparison*, shows other ways in which June 21, 2015, and June 26, 2011, are very similar meteorologically. The primary difference between June 21, 2015, and June 26, 2011, is the existence of a plume associated with wildfire emissions on June 21, 2015. The surrogate day analysis suggests the 7 ppb ozone was unaccounted for under similar conditions and this could be attributed to wildfire emissions. It is not likely that an exceedance would have occurred without the Hog fire.

3.9 CONCLUSION

The ambient monitoring evidence available from the El Paso UTEP (CAMS 12) and El Paso Chamizal (CAMS 41) monitoring sites clearly show the arrival and departure of an ozone plume on the afternoon of June 21, 2015. Furthermore, this plume included excessive amounts of $PM_{2.5}$ and CO pollutants, which are frequently associated with wildfire emissions. Satellite imagery taken from NASA's Worldview website confirms elevated levels of aerosol and CO that day. Taken together, these two pieces of information offer credible and compelling evidence that an ozone plume originating from wildfire emissions was transported into the El Paso area and affected air quality at the El Paso UTEP (CAMS 12) monitoring site by causing an exceedance of the 2015 eight-hour ozone NAAQS.

Backwards and forward HYSPLIT trajectories provide even better evidence of the likelihood of ozone, CO, and $PM_{2.5}$ transport from the Hog fire to the El Paso UTEP (CAMS 12) monitoring site. Forward trajectories from the fire consistently pass almost directly over the monitoring site, while back trajectories only miss the Hog fire by the width of a single grid cell. Furthermore these trajectories are all at low levels over the Hog fire and the El Paso UTEP (CAMS 12) monitoring site. This greatly increases the likelihood that transported pollutants mixed down to affect air quality at the monitoring site.

In conclusion, the similarity of the June 26, 2011, surrogate to June 21, 2015, shows that it is very unlikely that June 21, 2015, would have experienced eight-hour average ozone measurements of 77 ppb without the presence of the Hog fire in Arizona.

CHAPTER 4: PUBLIC COMMENTS

In following the requirements listed in Title 40 of the Code of Federal Regulations (CFR) §50.14(c)(3)(i), *Treatment of air quality monitoring data influenced by exceptional events*, the Texas Commission on Environmental Quality (TCEQ) posted this Exceptional Events Demonstration Package on the Agency website for public comment from September 1 through September 30, 2016. In accordance with 40 CFR §50.14(c)(3)(v), the TCEQ is documenting the public comments received in this section. All comments received during the comment period will be included in Appendix D: Public Comments.

CHAPTER 5: REFERENCES

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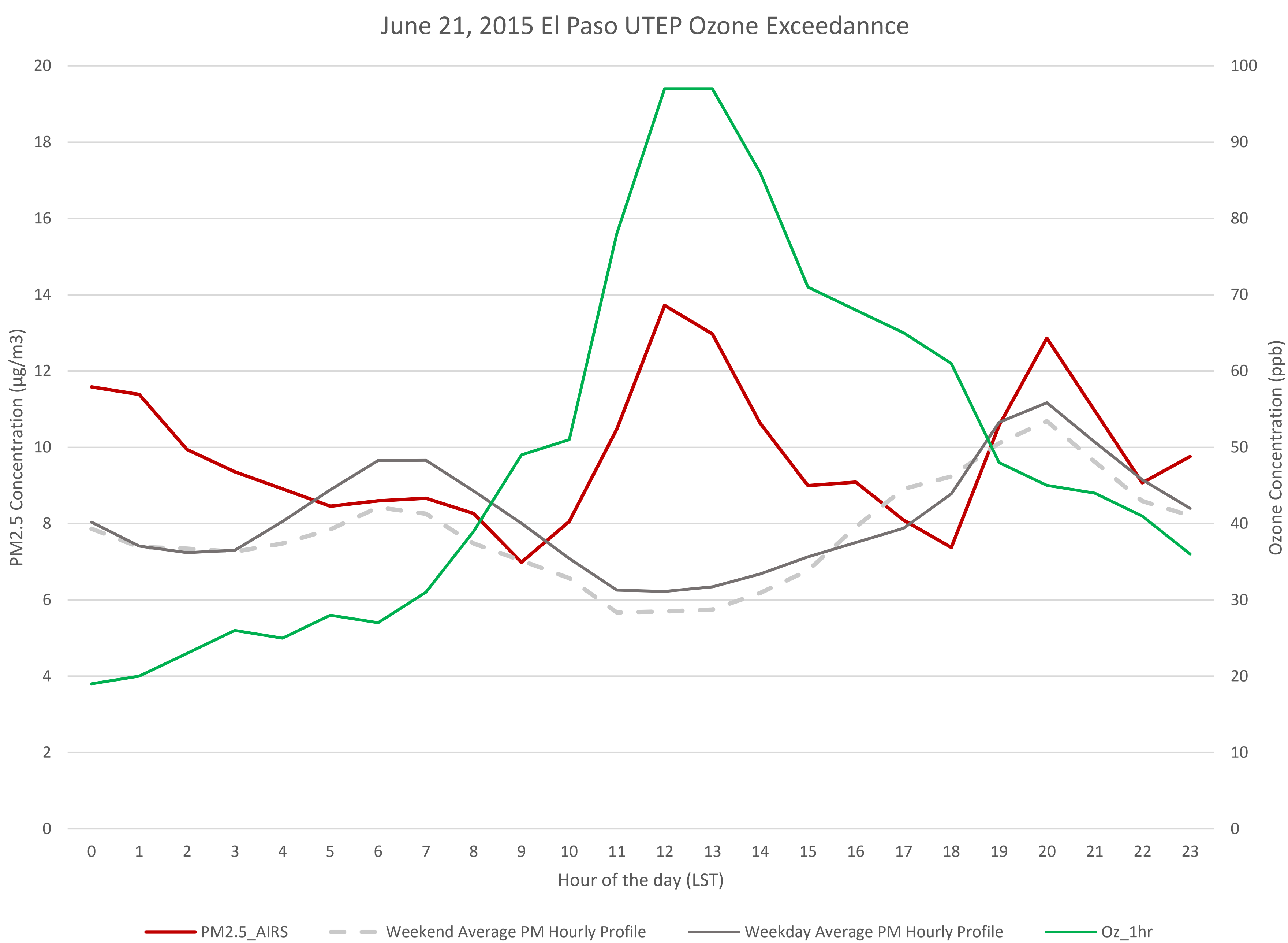
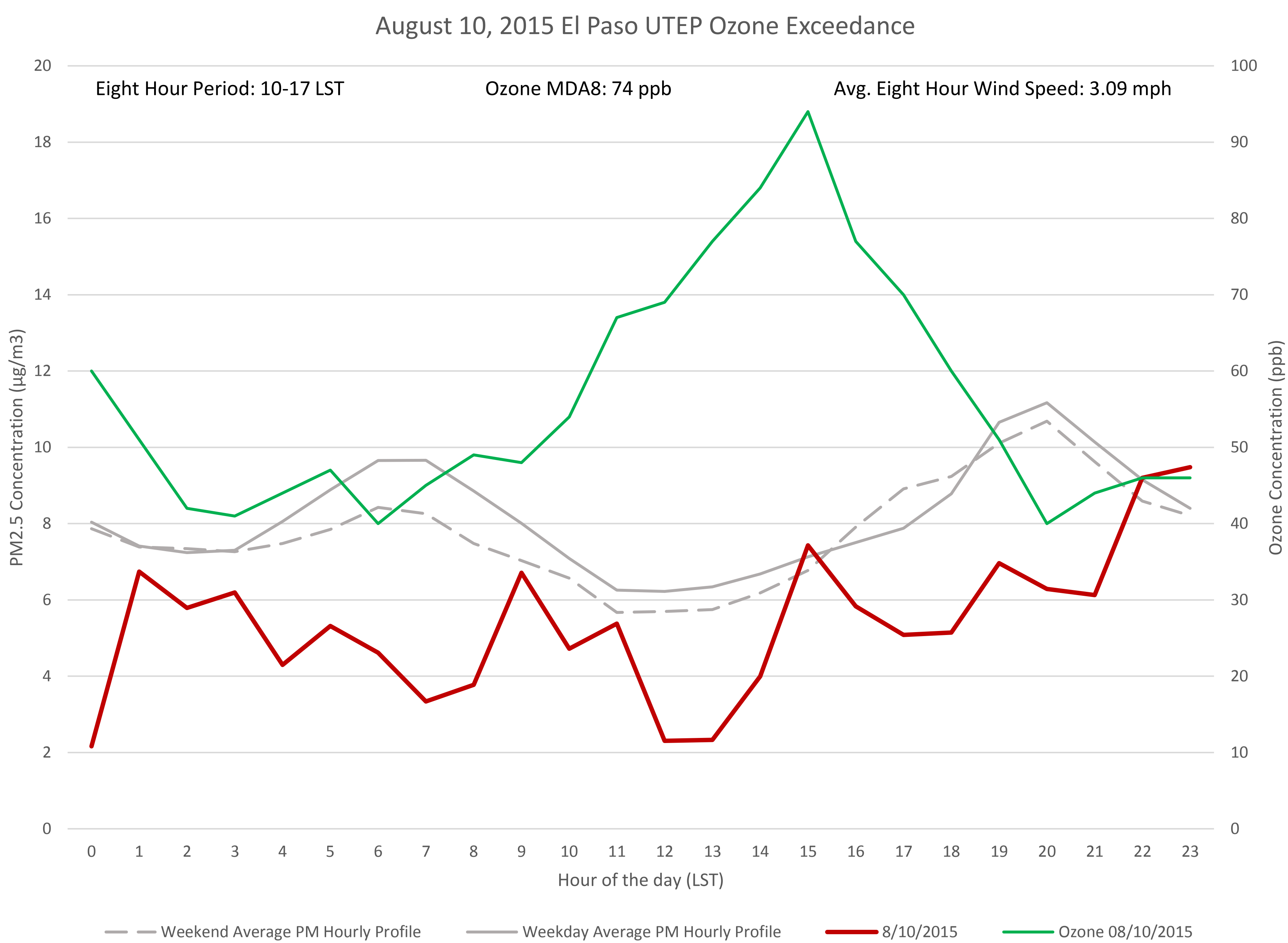
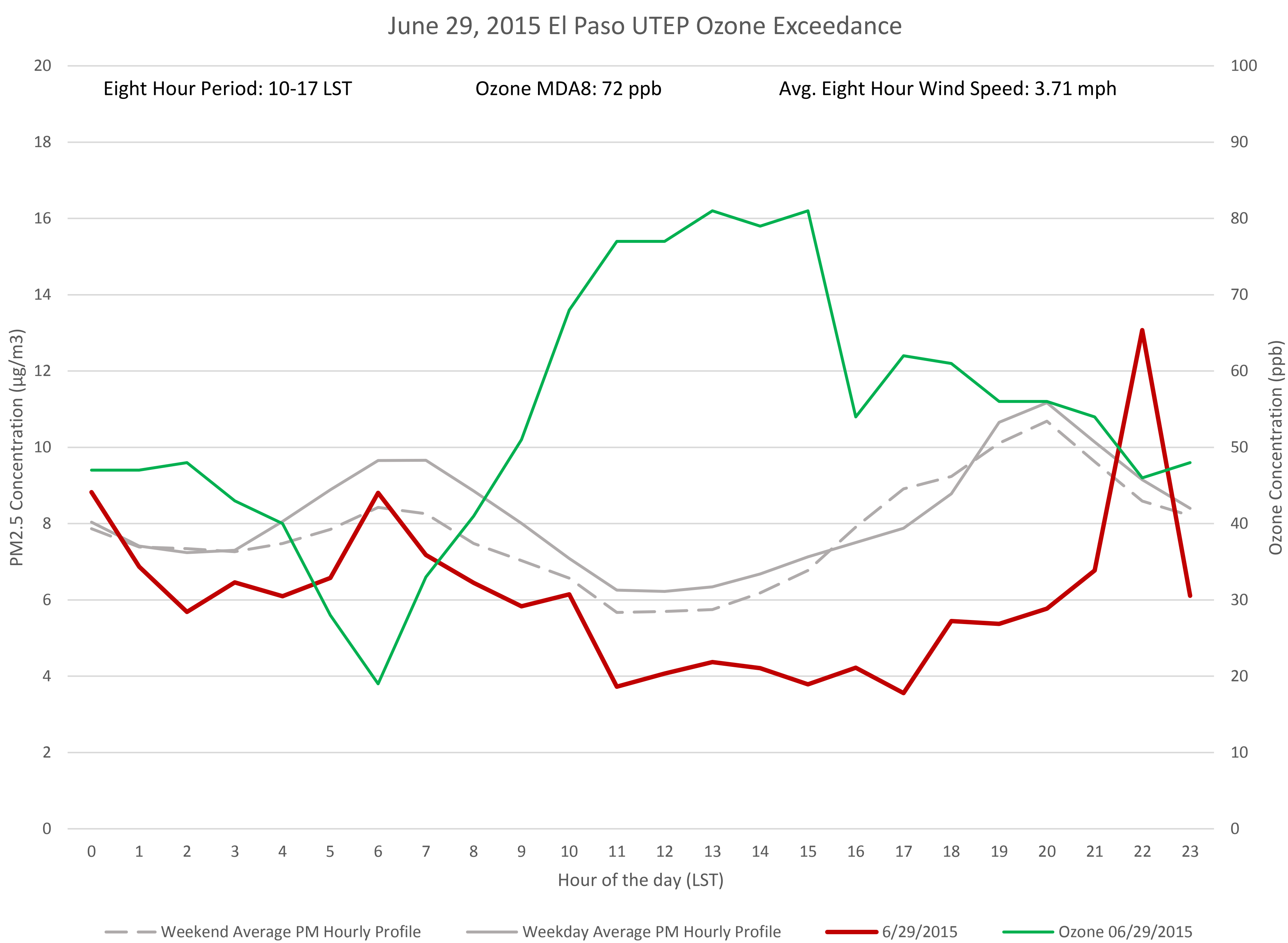
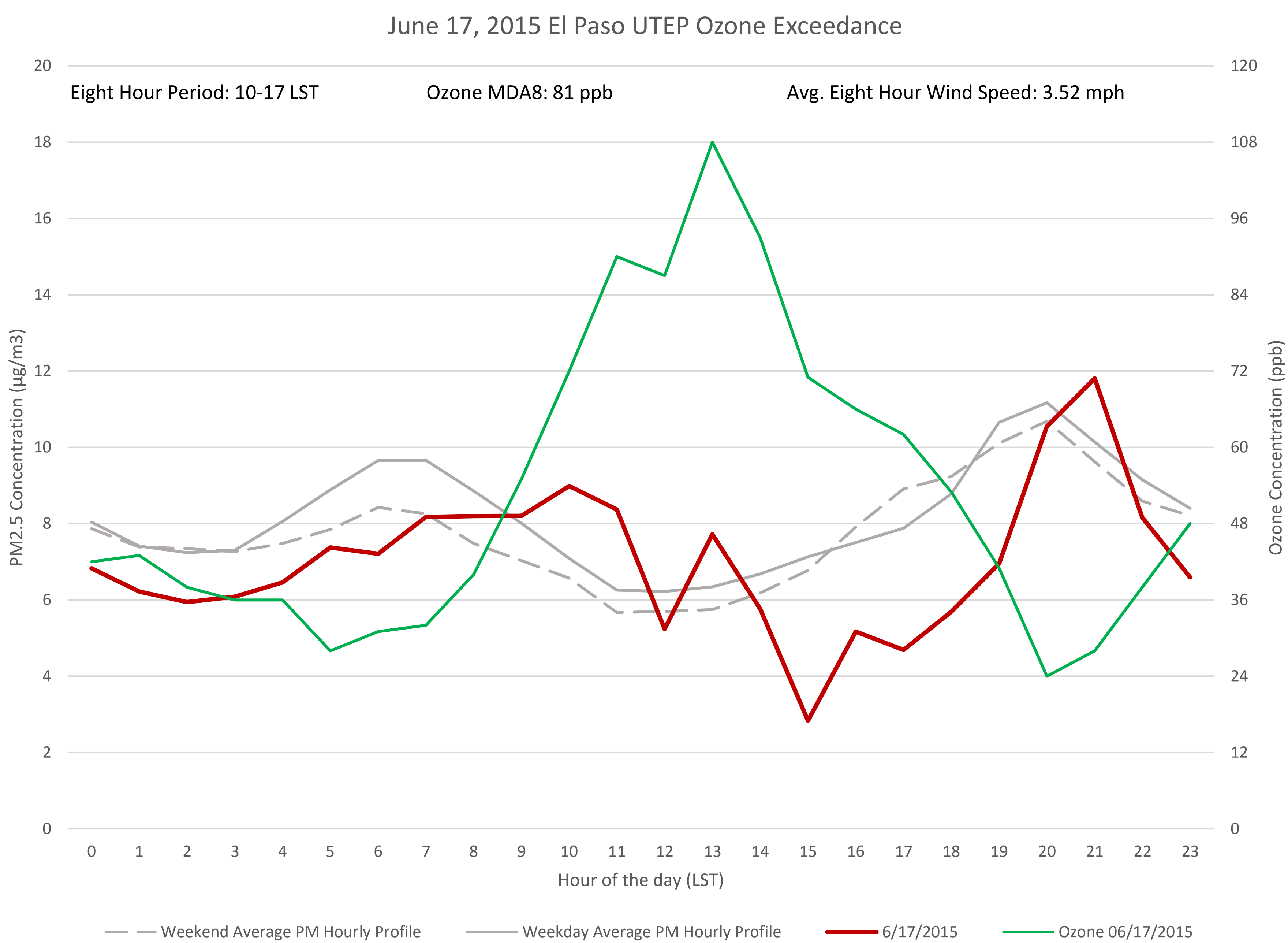
APPENDIX A: A REVIEW OF EL PASO UTEP (CAMS 12) MONITORING SITE EXCEEDANCE DAYS

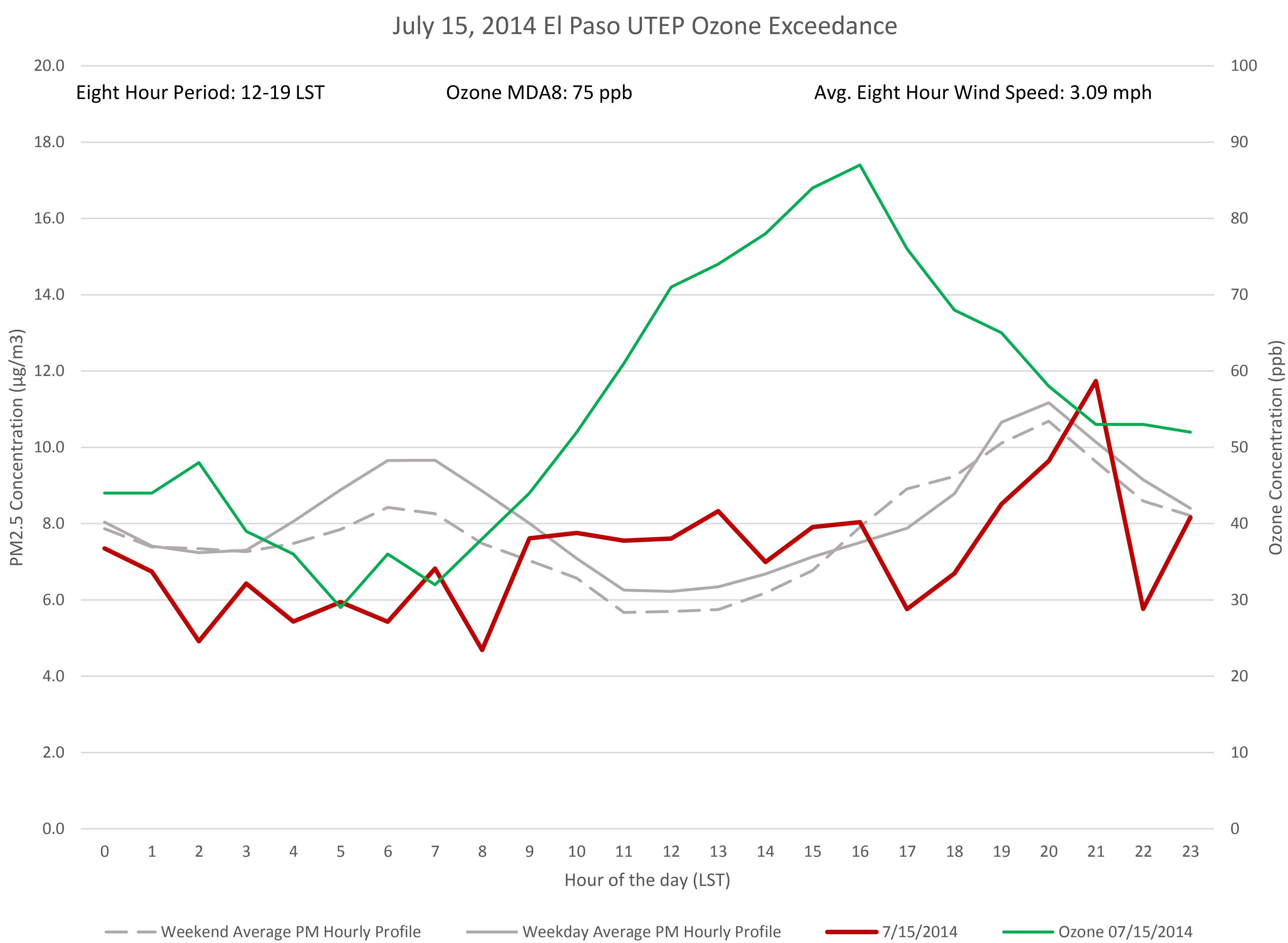

June 21, 2015 El Paso UTEP Ozone Exceedannce
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
20
18
16
14
12
10
8
6
4
2
0
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of the day (LST)
PM2.5_AIRS
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
Oz_1hr

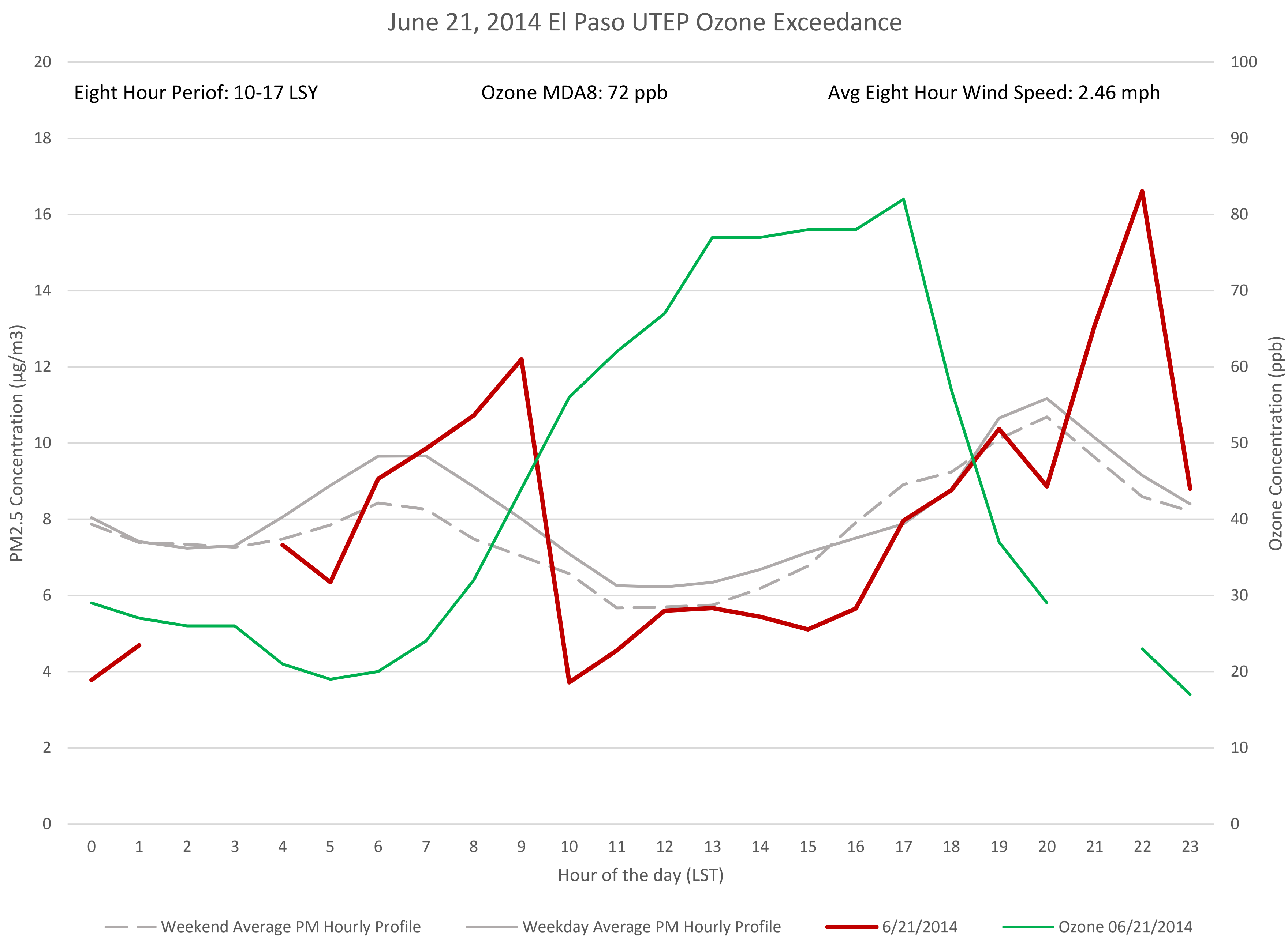

August 10, 2015 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 74 ppb
Avg. Eight Hour Wind Speed: 3.09 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0
2
4
6
8
10
12
14
16
18
20
10
20
30
40
50
60
70
80
90
100
1
3
5
7
9
11
13
15
17
19
21
22
23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/10/2015
Ozone 08/10/2015


June 29, 2015 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 72 ppb
Avg. Eight Hour Wind Speed: 3.71 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70
80
90
100
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/29/2015
Ozone 06/29/2015

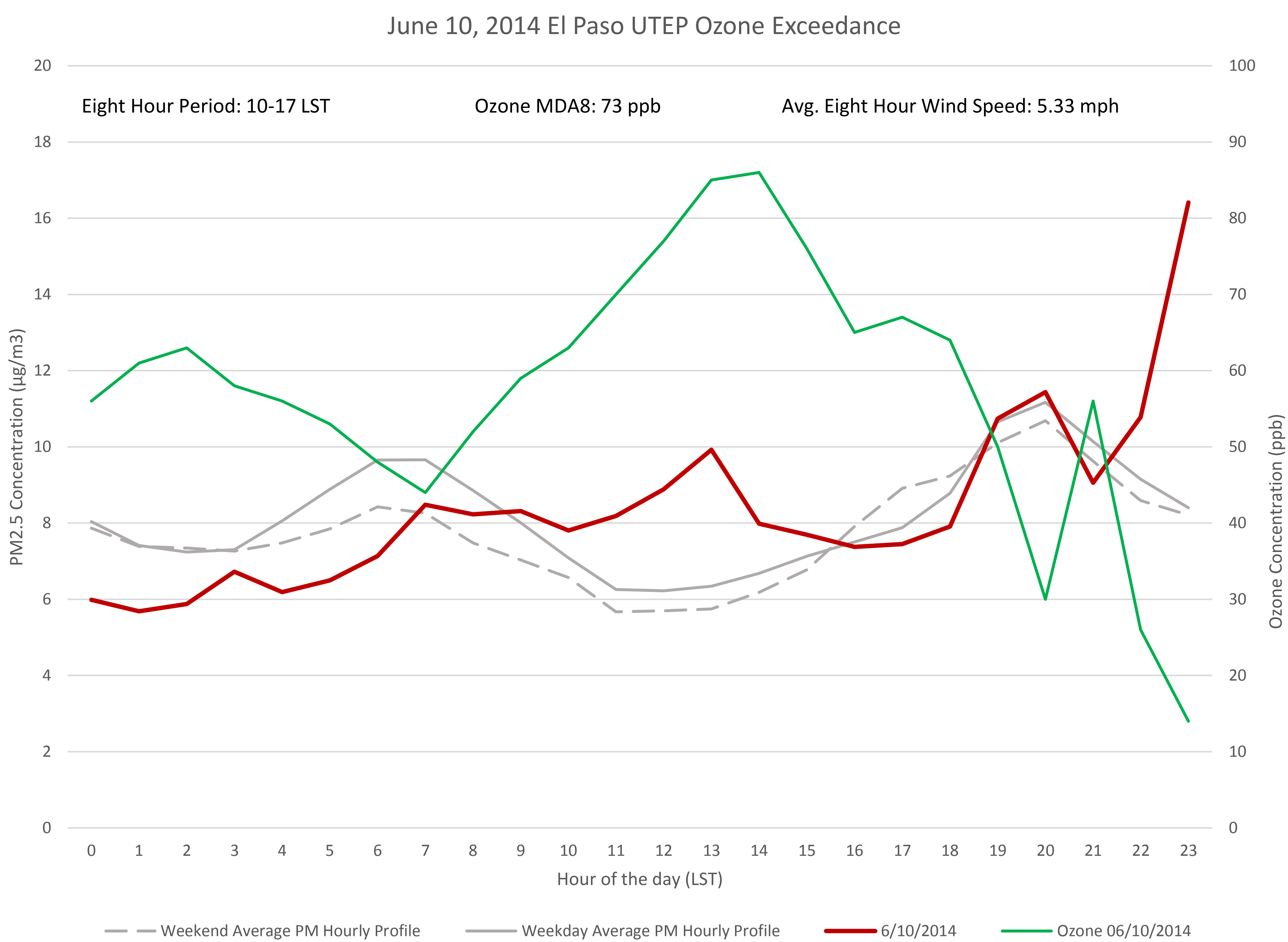


June 17, 2015 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 81 ppb
Avg. Eight Hour Wind Speed: 3.52 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0 2 4 6 8 10 12 14 16 18 20
0 12 24 36 48 60 72 84 96 108 120
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/17/2015
Ozone 06/17/2015

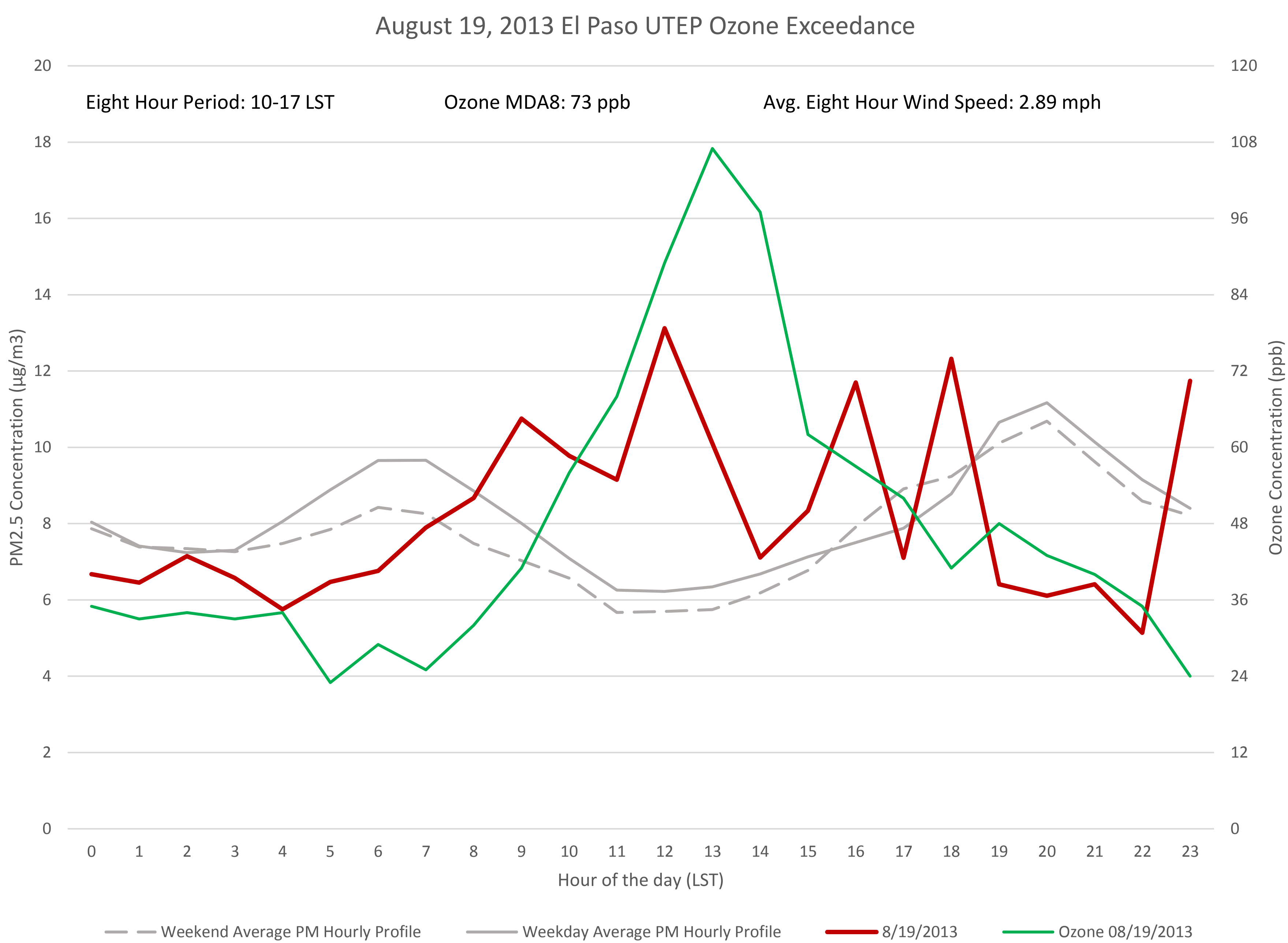

July 15, 2014 El Paso UTEP Ozone Exceedance
Eight Hour Period: 12-19 LST
Ozone MDA8: 75 ppb
Avg. Eight Hour Wind Speed: 3.09 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/15/2014
Ozone 07/15/2014



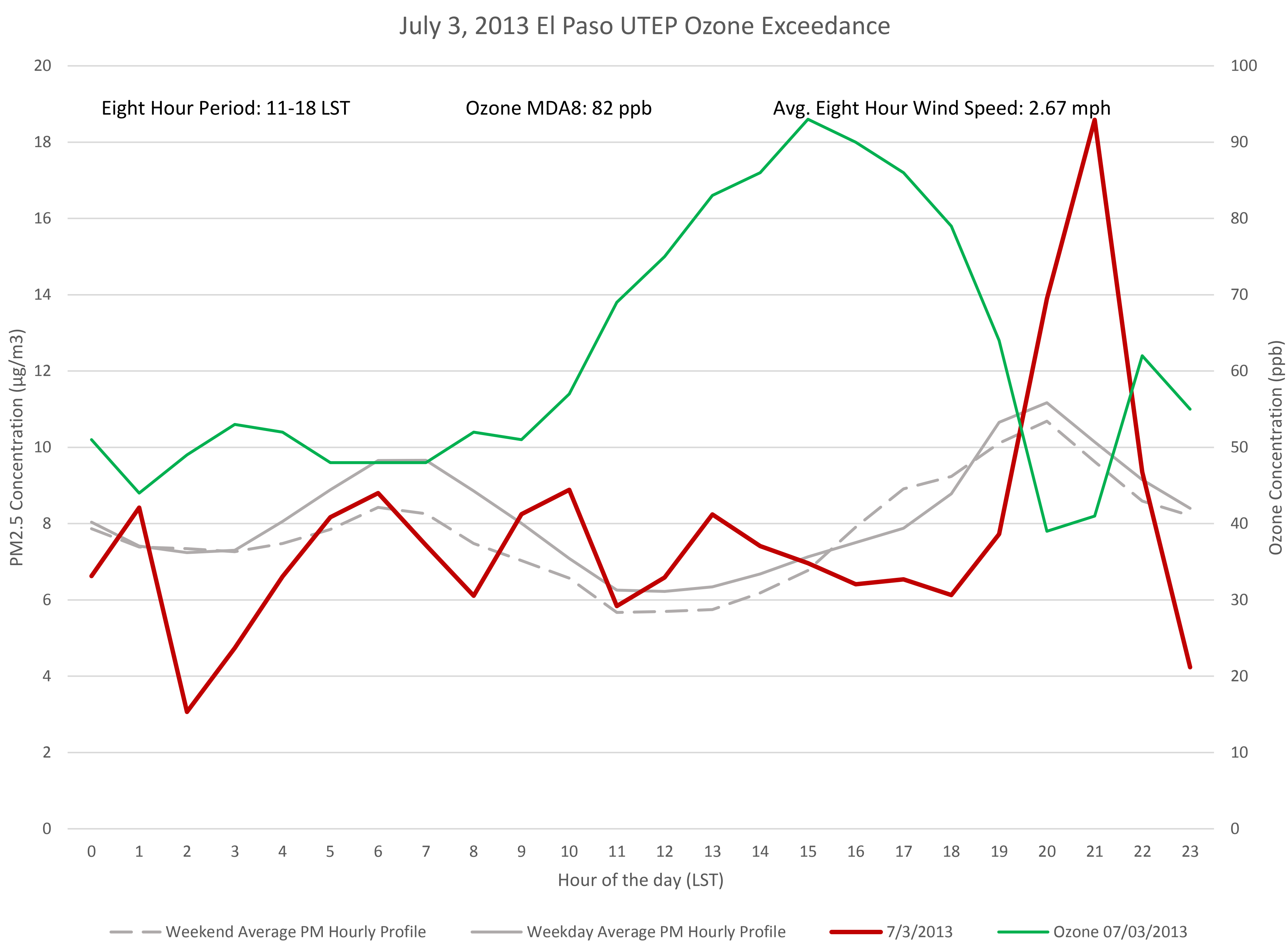
June 21, 2014 El Paso UTEP Ozone Exceedance
Eight Hour Periof: 10-17 LSY
Ozone MDA8: 72 ppb
Avg Eight Hour Wind Speed: 2.46 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/21/2014
Ozone 06/21/2014



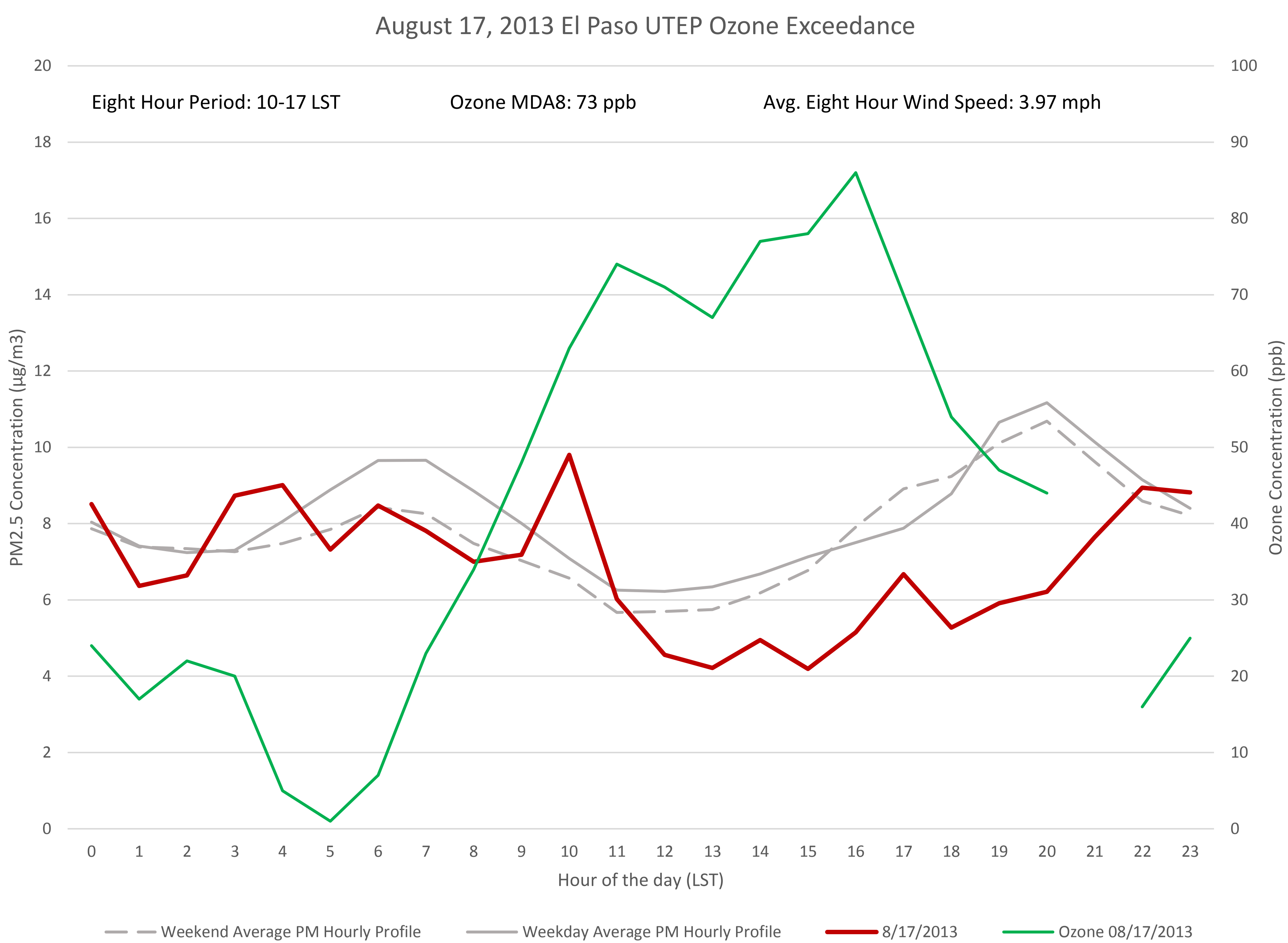
June 10, 2014 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 73 ppb
Avg. Eight Hour Wind Speed: 5.33 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0
2
4
6
8
10
12
14
16
18
20
10
20
30
40
50
60
70
80
90
100
1
3
5
7
9
11
13
15
17
19
21
22
23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/10/2014
Ozone 06/10/2014

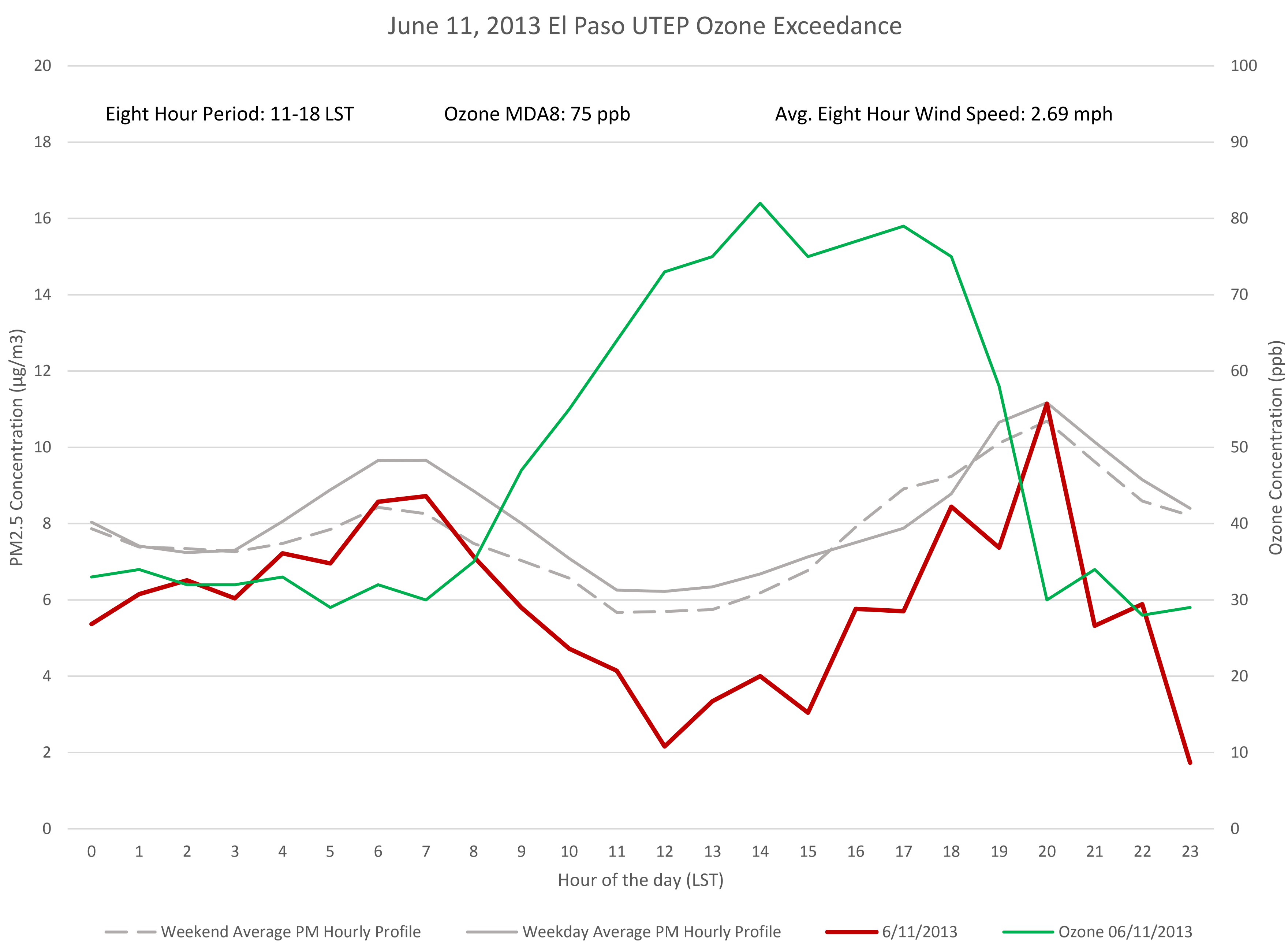


August 19, 2013 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 73 ppb
Avg. Eight Hour Wind Speed: 2.89 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/19/2013
Ozone 08/19/2013

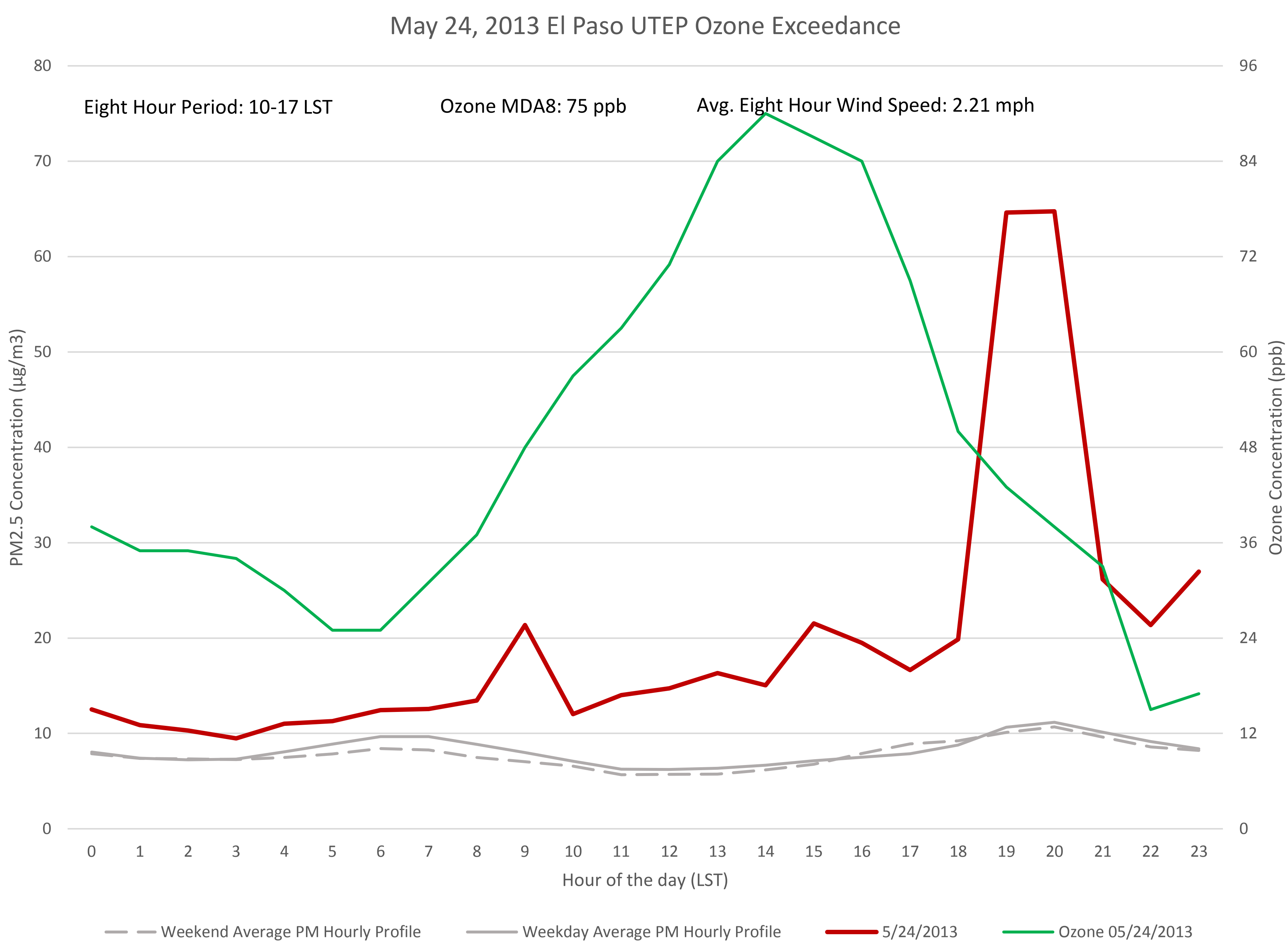


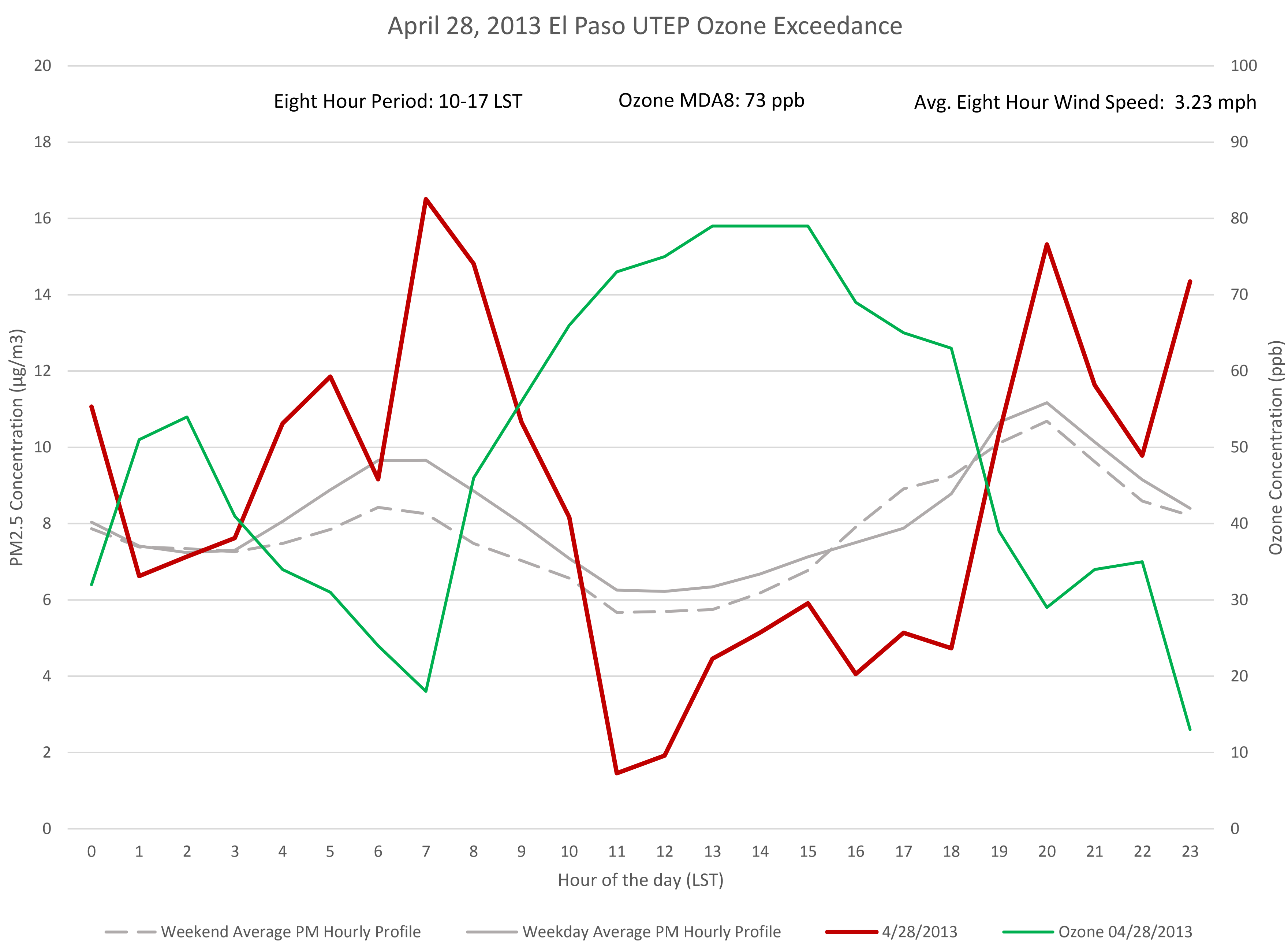
July 3, 2013 El Paso UTEP Ozone Exceedance
Eight Hour Period: 11-18 LST
Ozone MDA8: 82 ppb
Avg. Eight Hour Wind Speed: 2.67 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/3/2013
Ozone 07/03/2013


August 17, 2013 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 73 ppb
Avg. Eight Hour Wind Speed: 3.97 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/17/2013
Ozone 08/17/2013

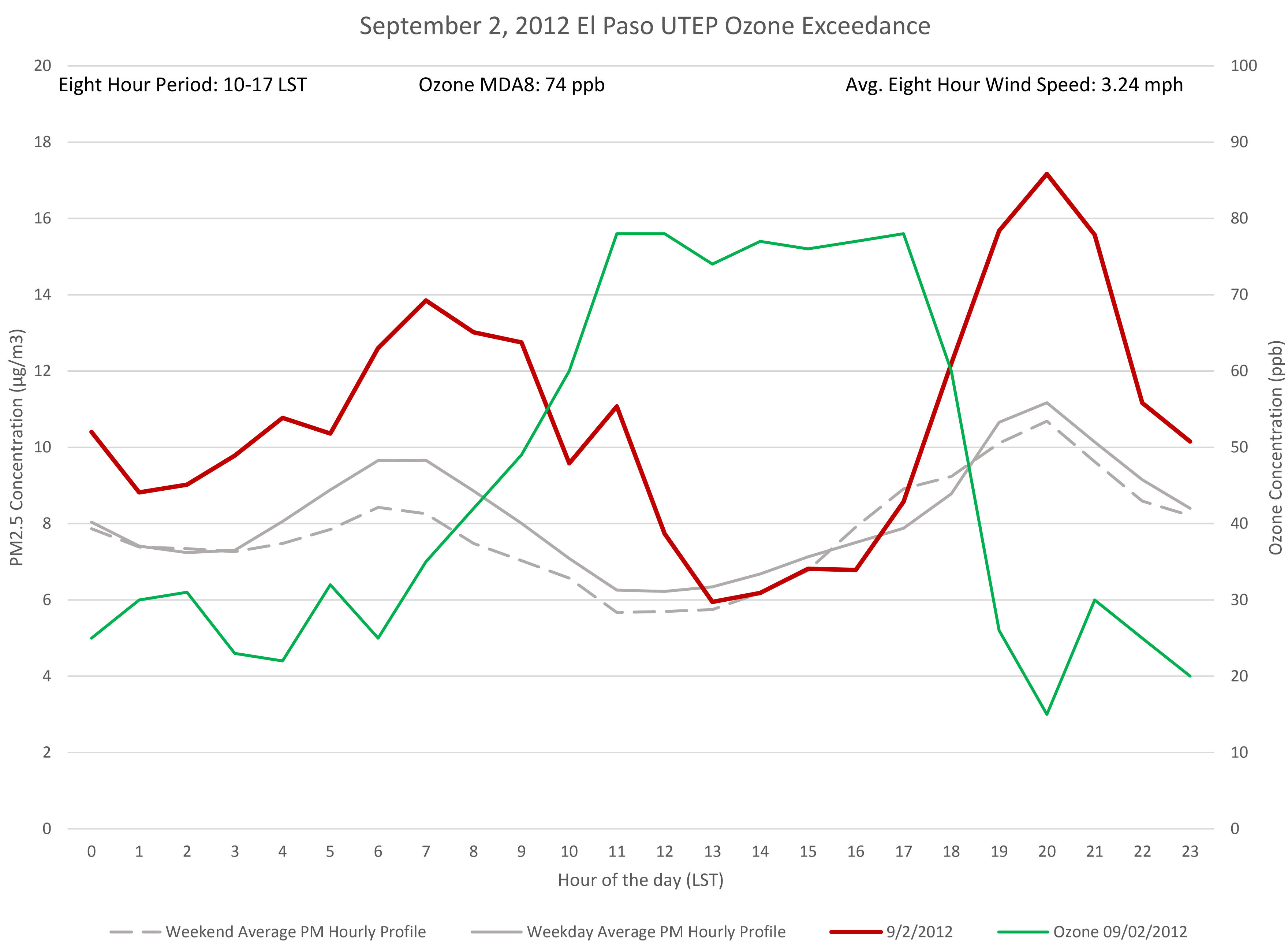


June 11, 2013 El Paso UTEP Ozone Exceedance
Eight Hour Period: 11-18 LST
Ozone MDA8: 75 ppb
Avg. Eight Hour Wind Speed: 2.69 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/11/2013
Ozone 06/11/2013

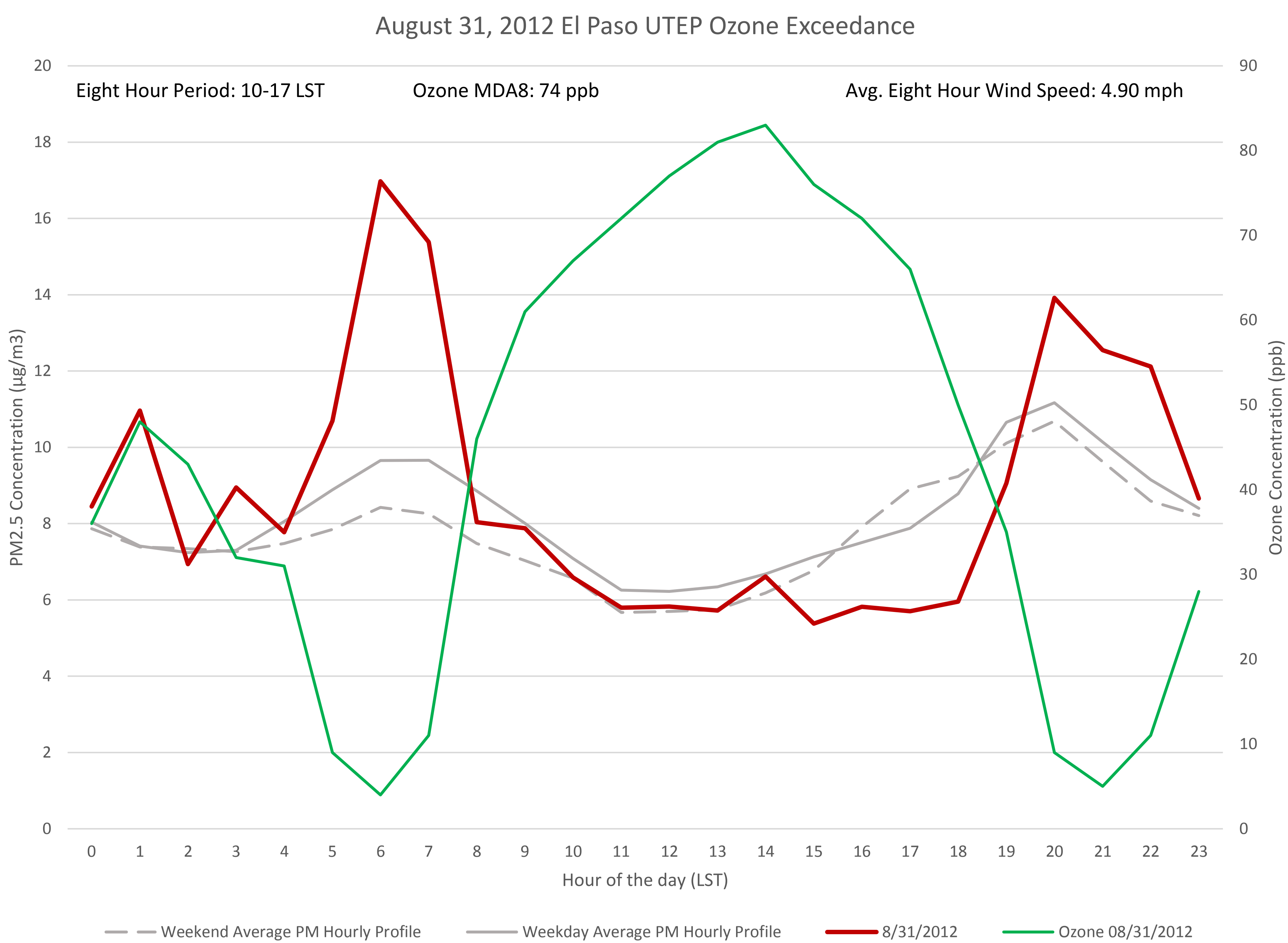

May 24, 2013 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 75 ppb
Avg. Eight Hour Wind Speed: 2.21 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
0
10
20
30
40
50
60
70
80
0
12
24
36
48
60
72
84
96
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
5/24/2013
Ozone 05/24/2013

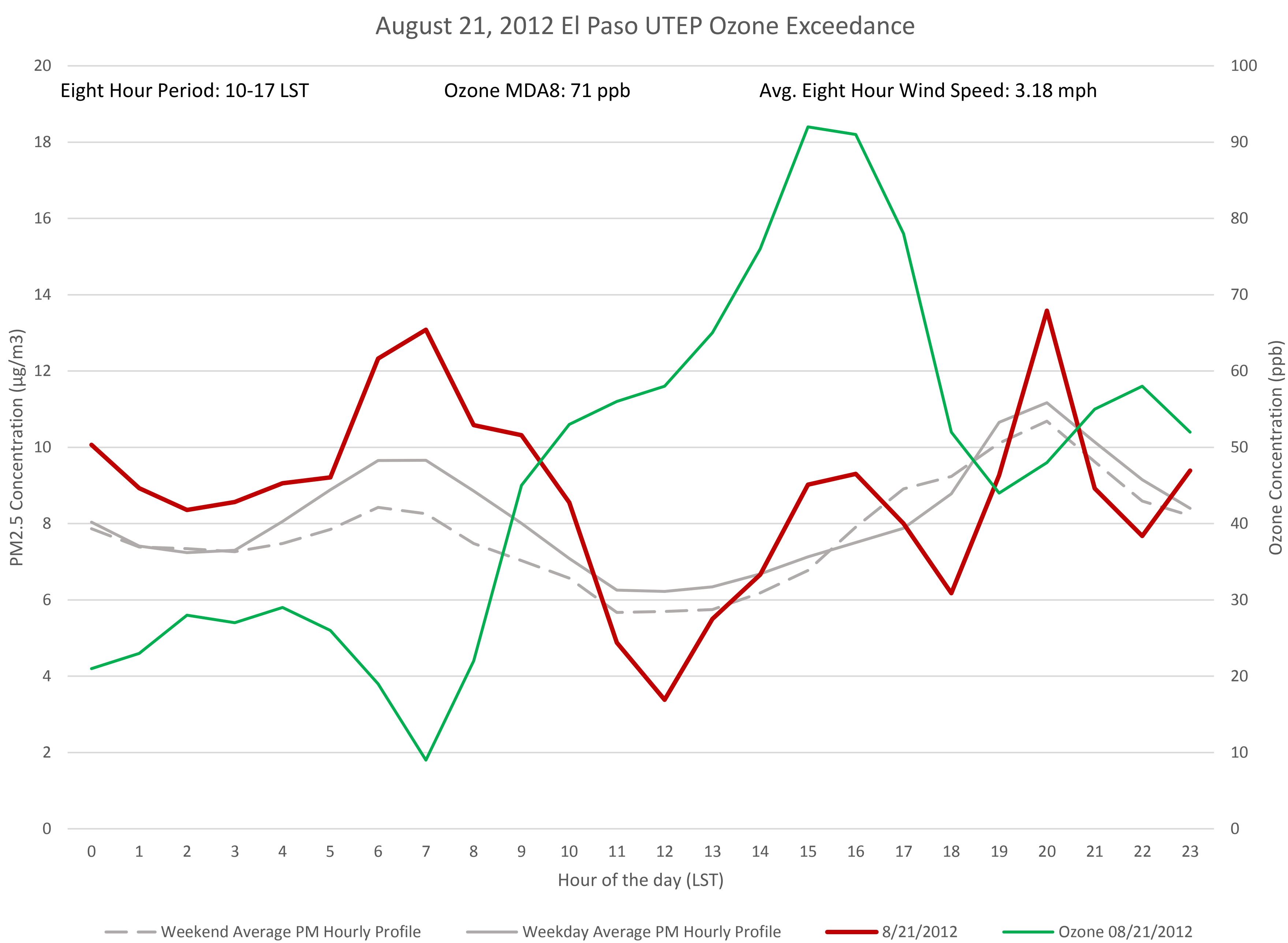


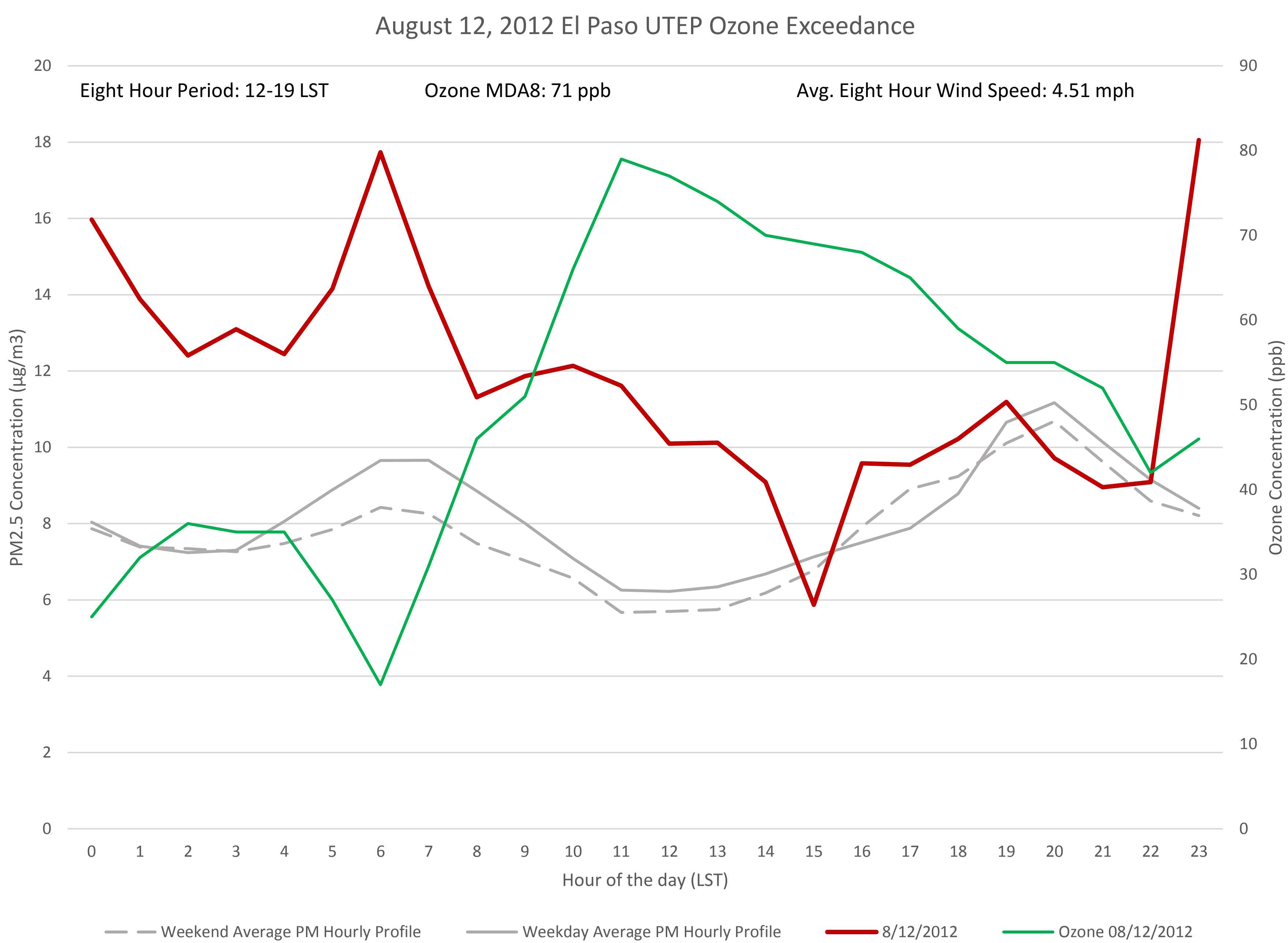
April 28, 2013 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 73 ppb
Avg. Eight Hour Wind Speed: 3.23 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70
80
90
100
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
4/28/2013
Ozone 04/28/2013



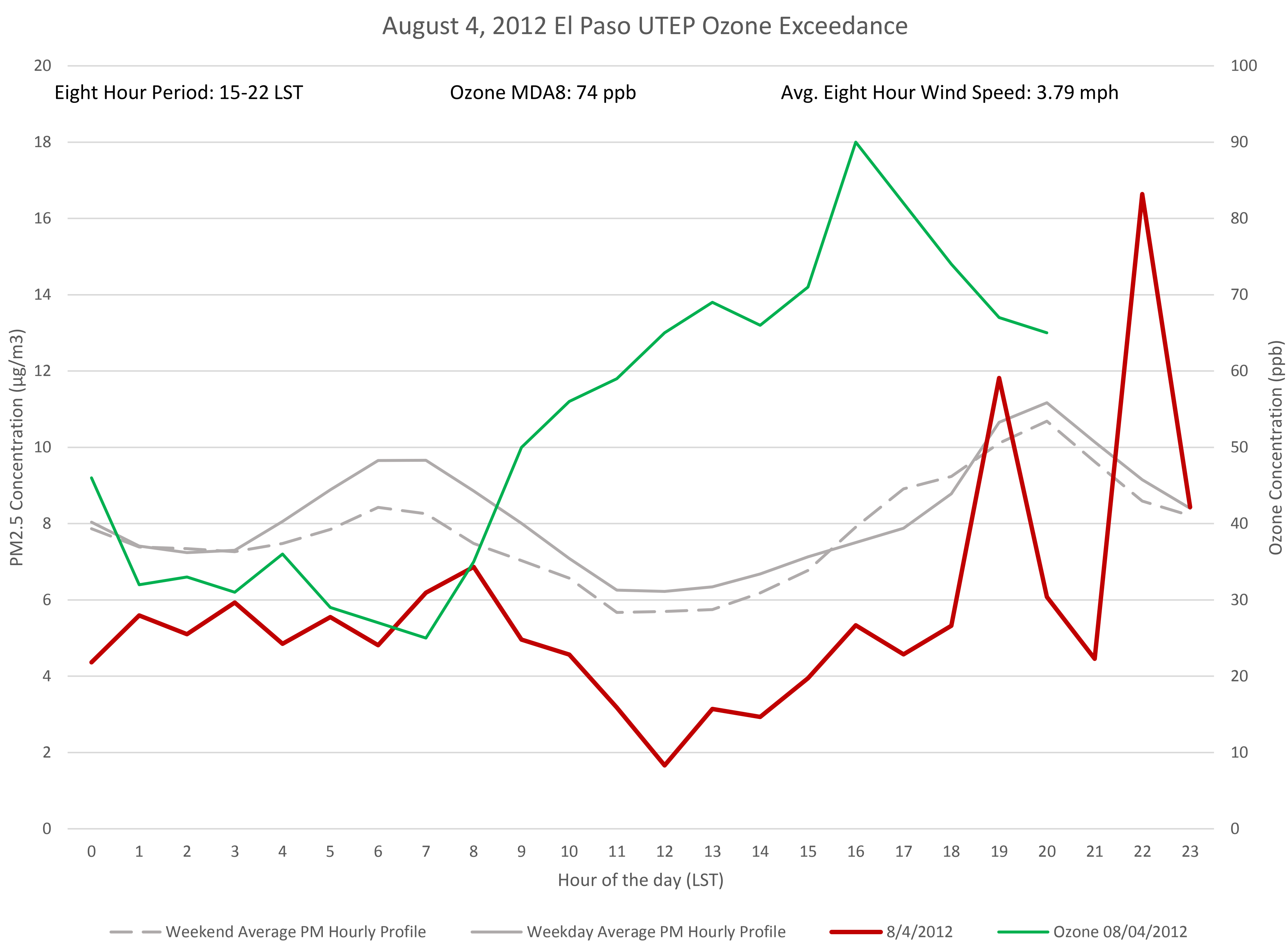
September 2, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 74 ppb
Avg. Eight Hour Wind Speed: 3.24 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0 2 4 6 8 10 12 14 16 18 20
0 10 20 30 40 50 60 70 80 90 100
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
9/2/2012
Ozone 09/02/2012


August 31, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 74 ppb
Avg. Eight Hour Wind Speed: 4.90 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/31/2012
Ozone 08/31/2012

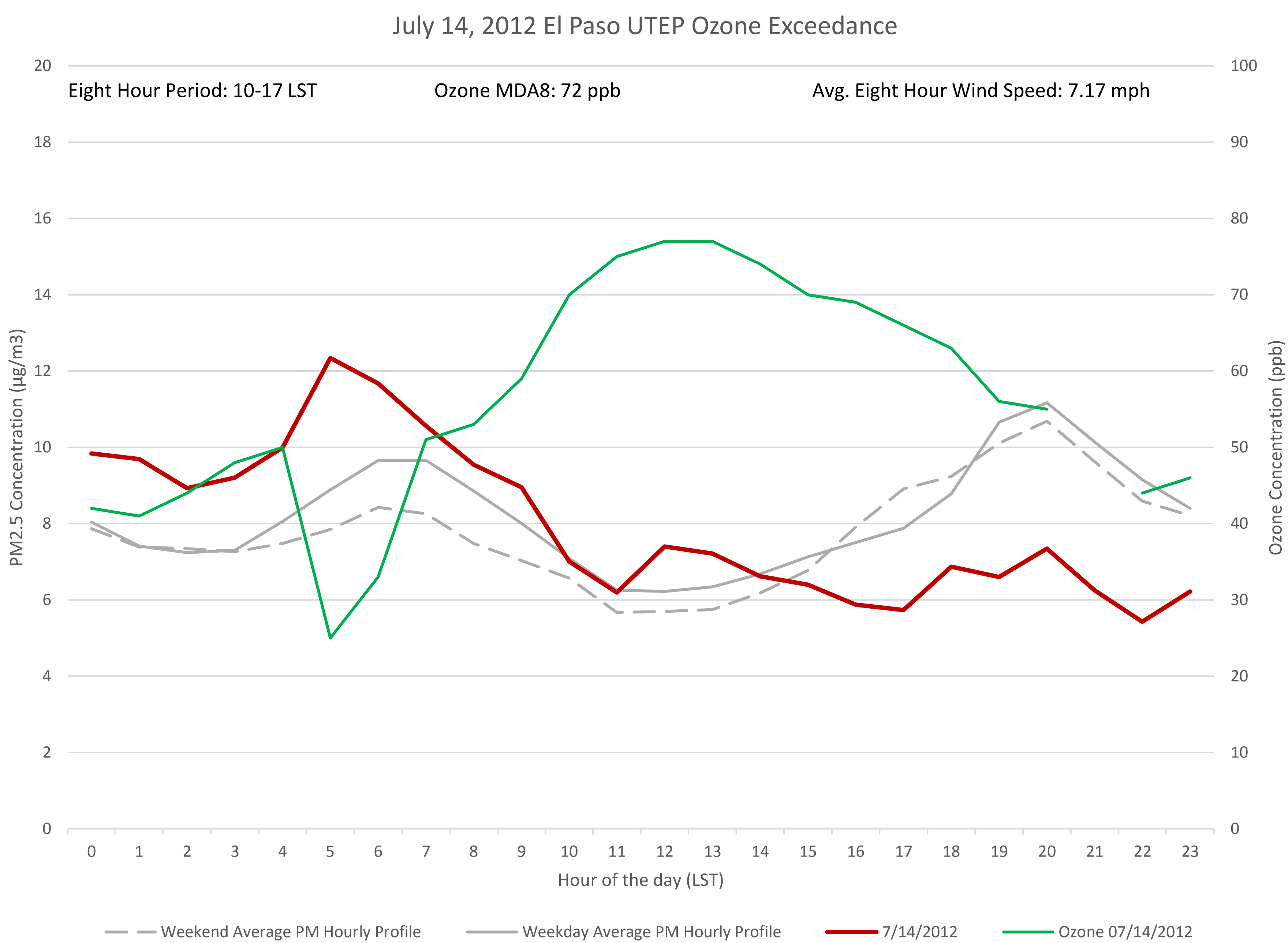

August 21, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 71 ppb
Avg. Eight Hour Wind Speed: 3.18 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/21/2012
Ozone 08/21/2012



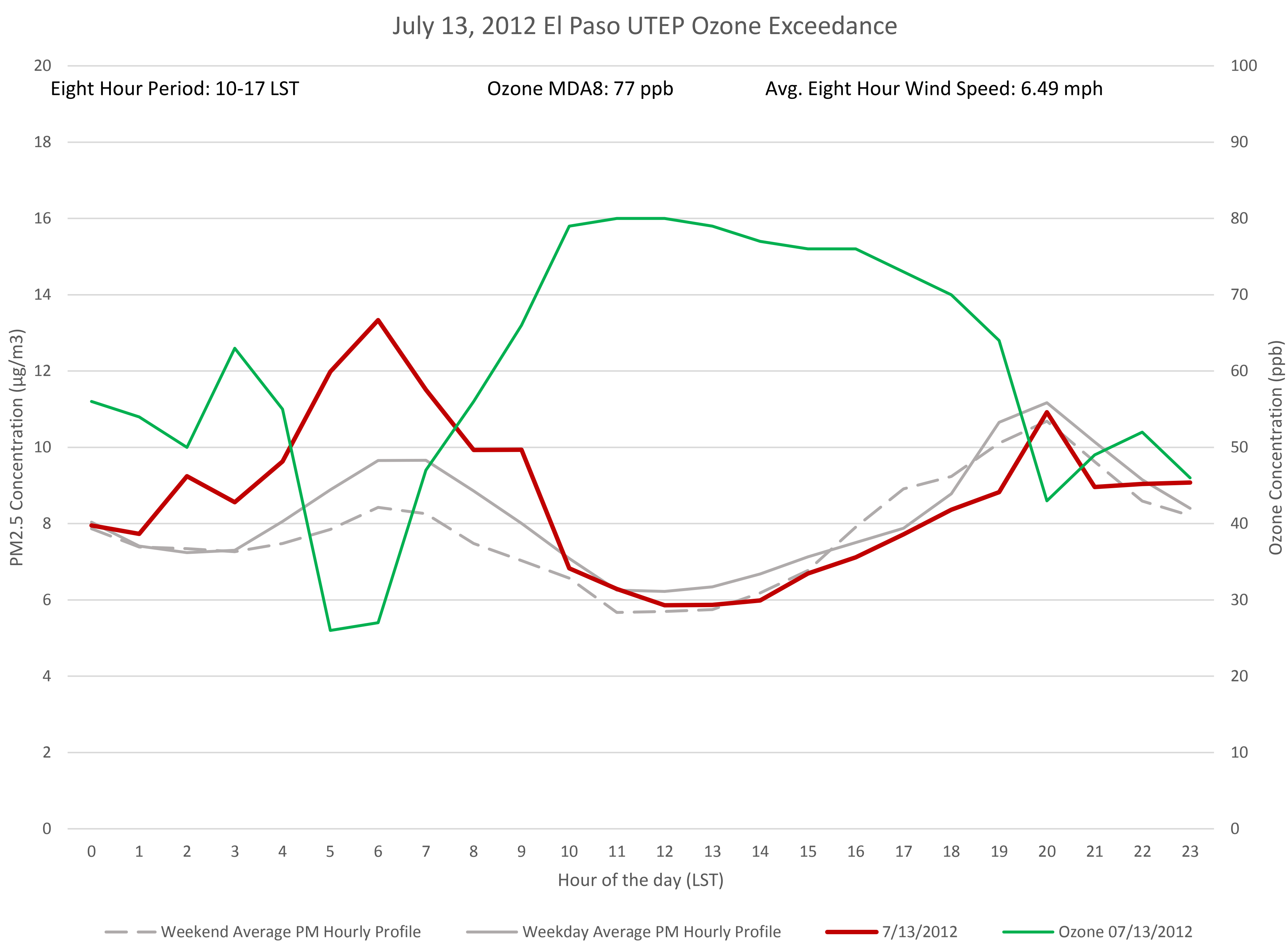
August 12, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 12-19 LST
Ozone MDA8: 71 ppb
Avg. Eight Hour Wind Speed: 4.51 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
0 2 4 6 8 10 12 14 16 18 20
0 10 20 30 40 50 60 70 80 90
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/12/2012
Ozone 08/12/2012

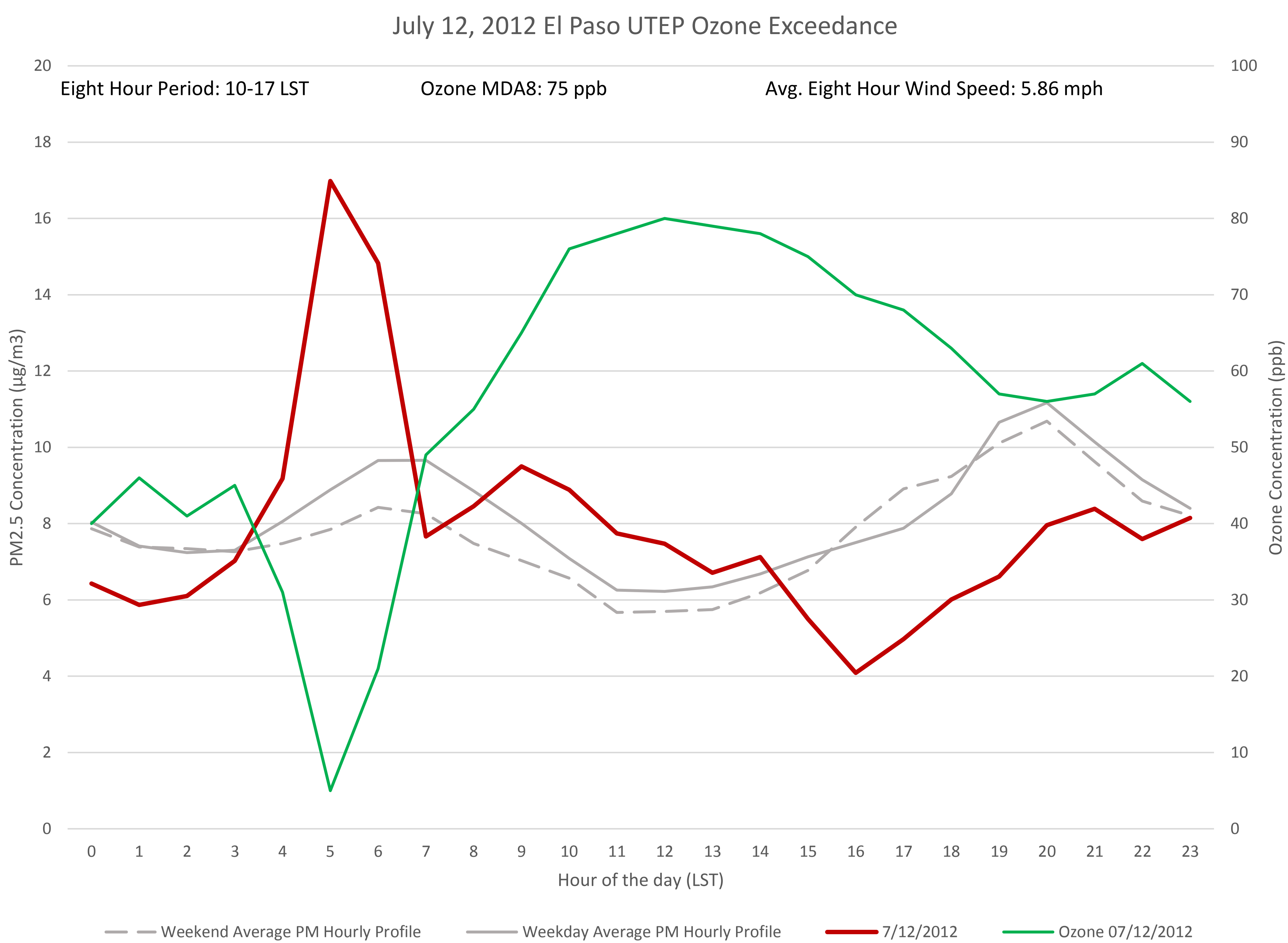


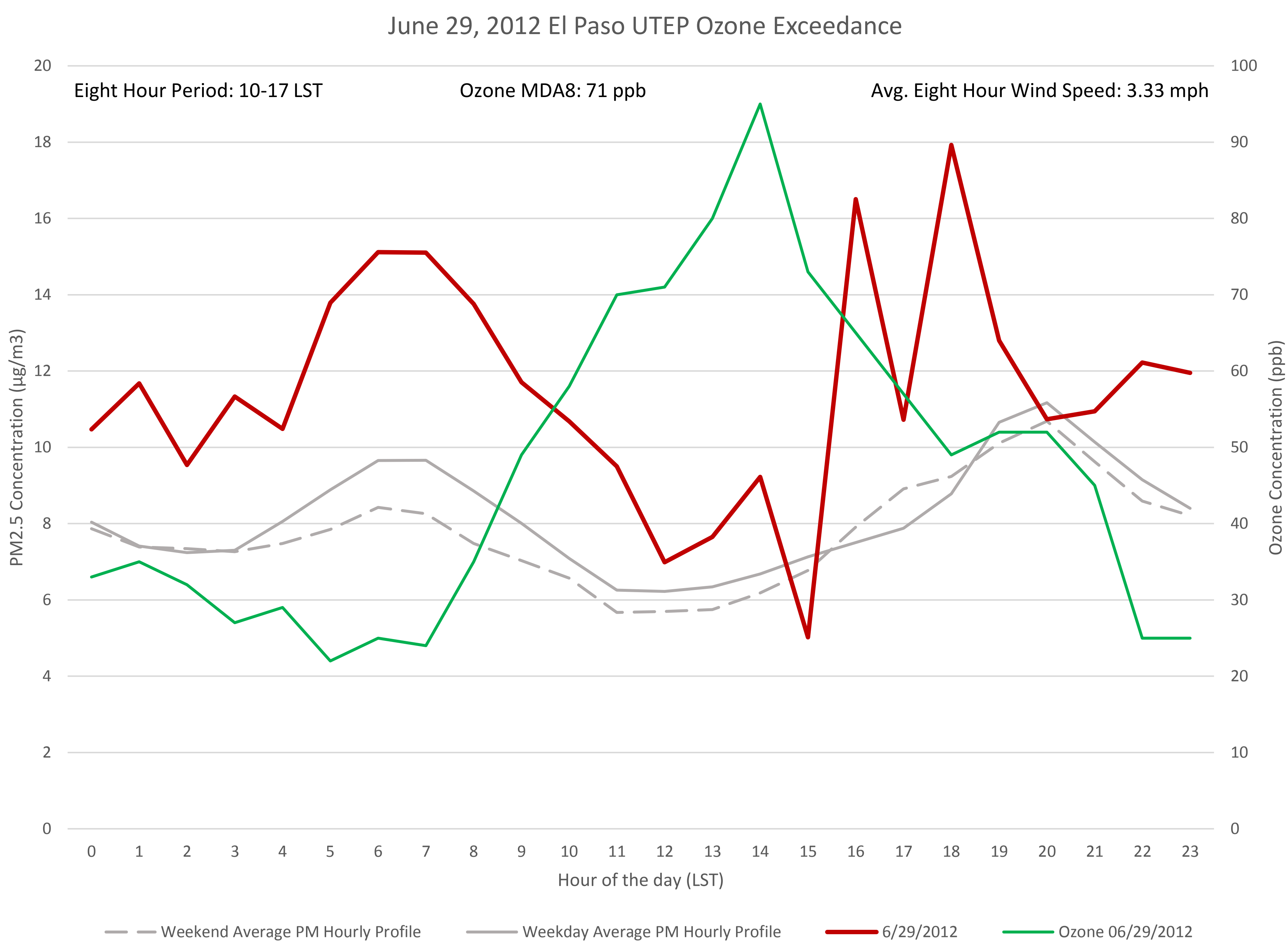
August 4, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 15-22 LST
Ozone MDA8: 74 ppb
Avg. Eight Hour Wind Speed: 3.79 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0
2
4
6
8
10
12
14
16
18
20
10
20
30
40
50
60
70
80
90
100
1
3
5
7
9
11
13
15
17
19
21
22
23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/4/2012
Ozone 08/04/2012



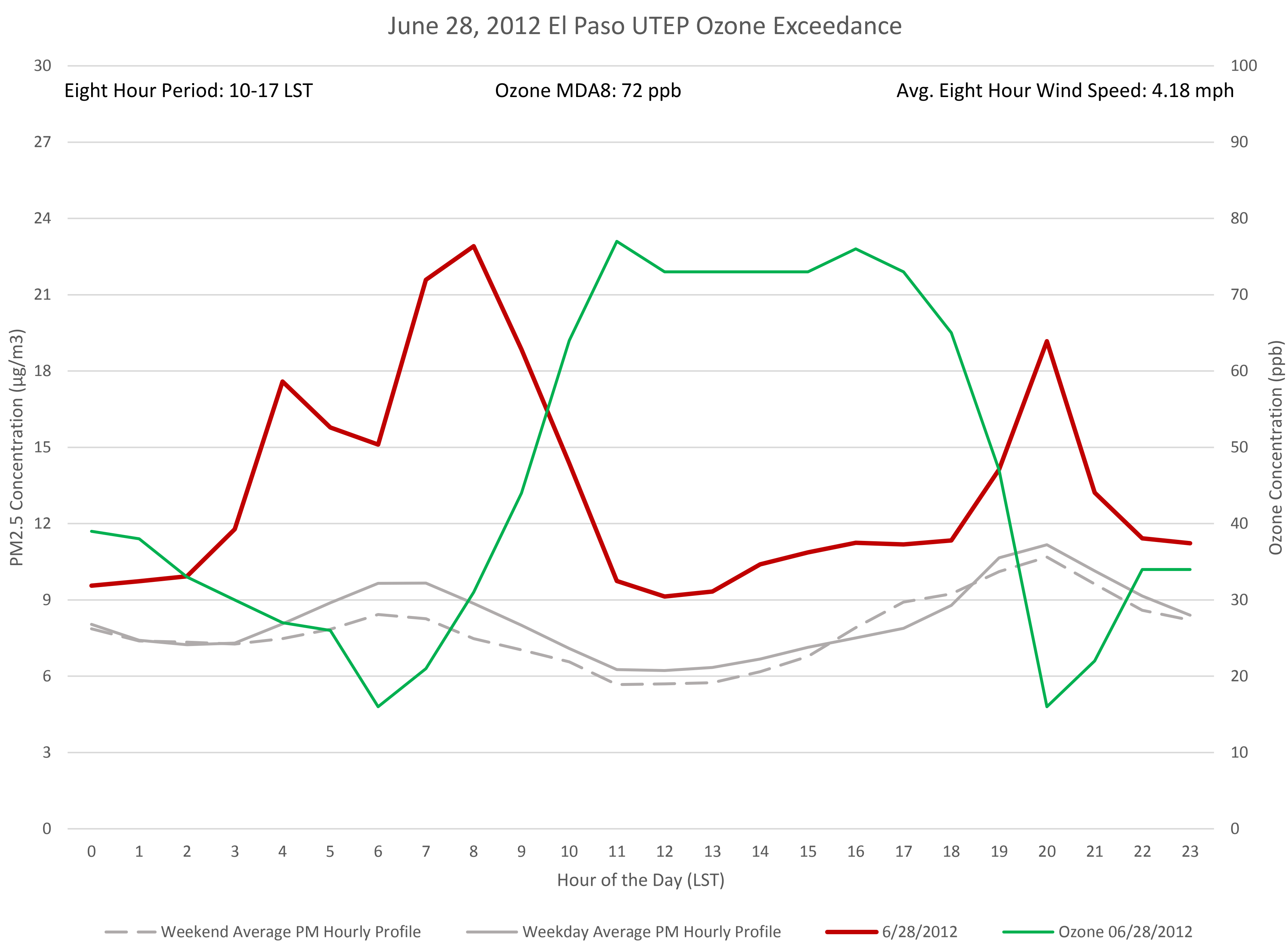
July 14, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 72 ppb
Avg. Eight Hour Wind Speed: 7.17 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/14/2012
Ozone 07/14/2012

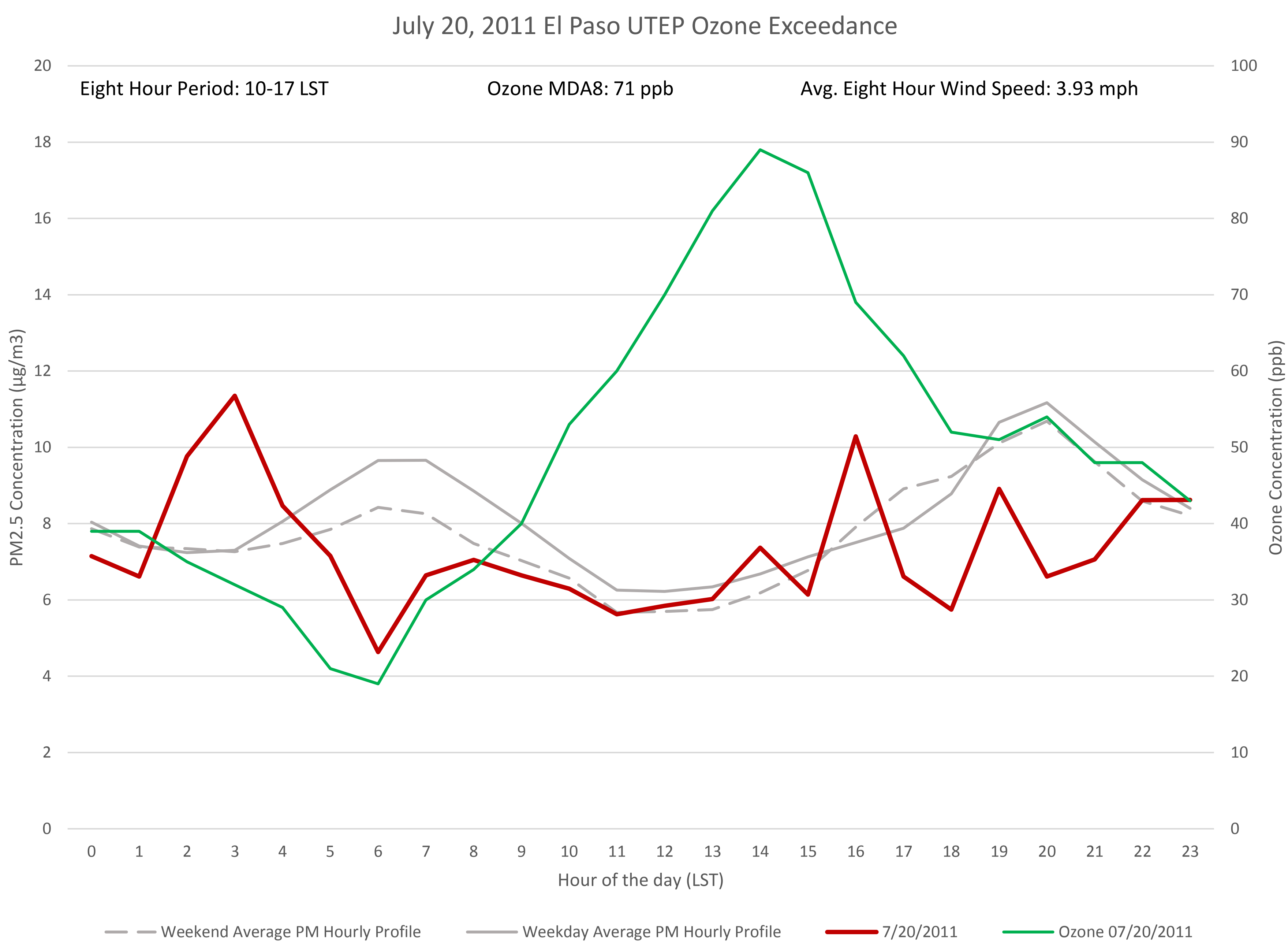

July 13, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 77 ppb
Avg. Eight Hour Wind Speed: 6.49 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/13/2012
Ozone 07/13/2012


July 12, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 75 ppb
Avg. Eight Hour Wind Speed: 5.86 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/12/2012
Ozone 07/12/2012

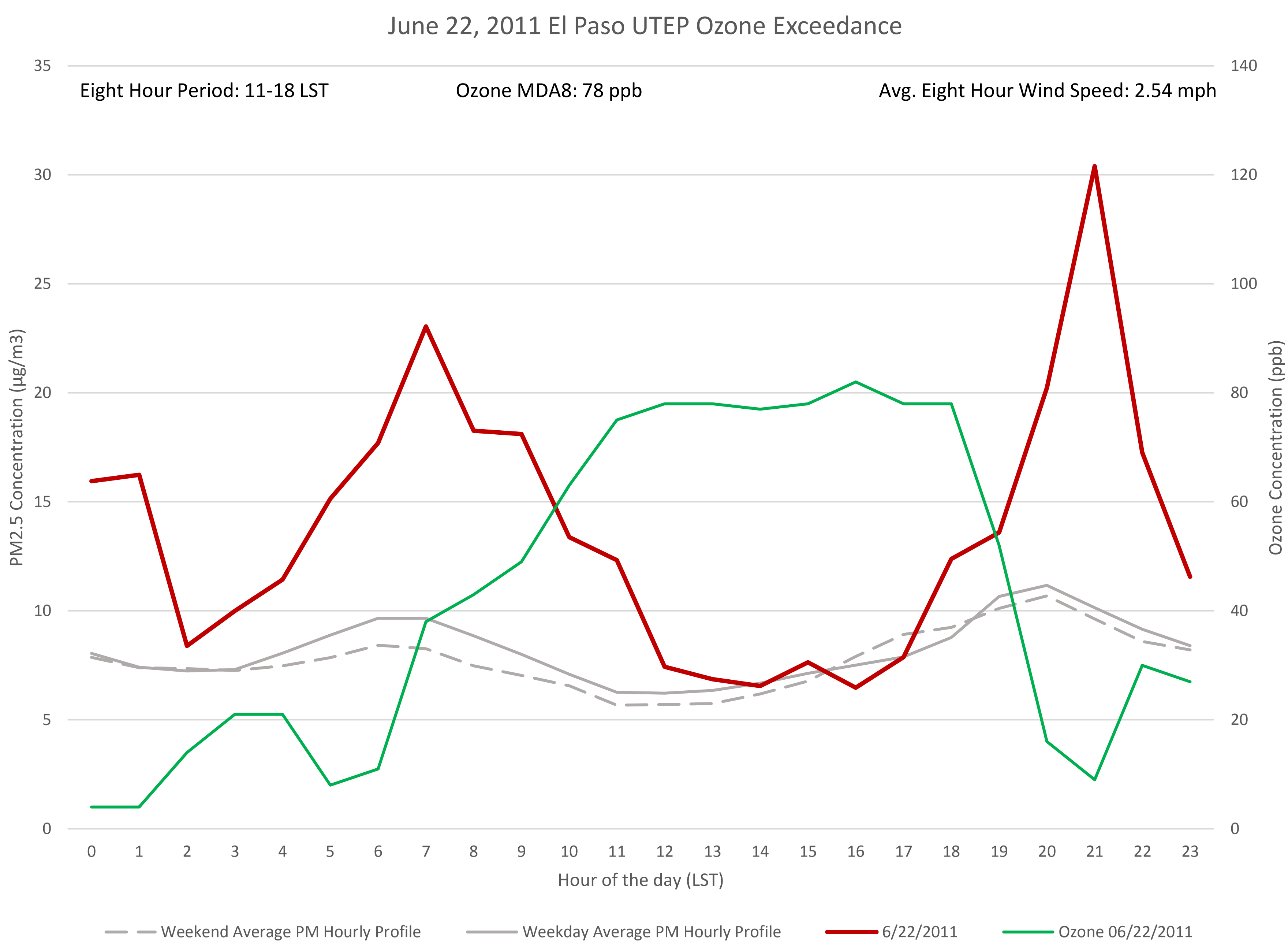


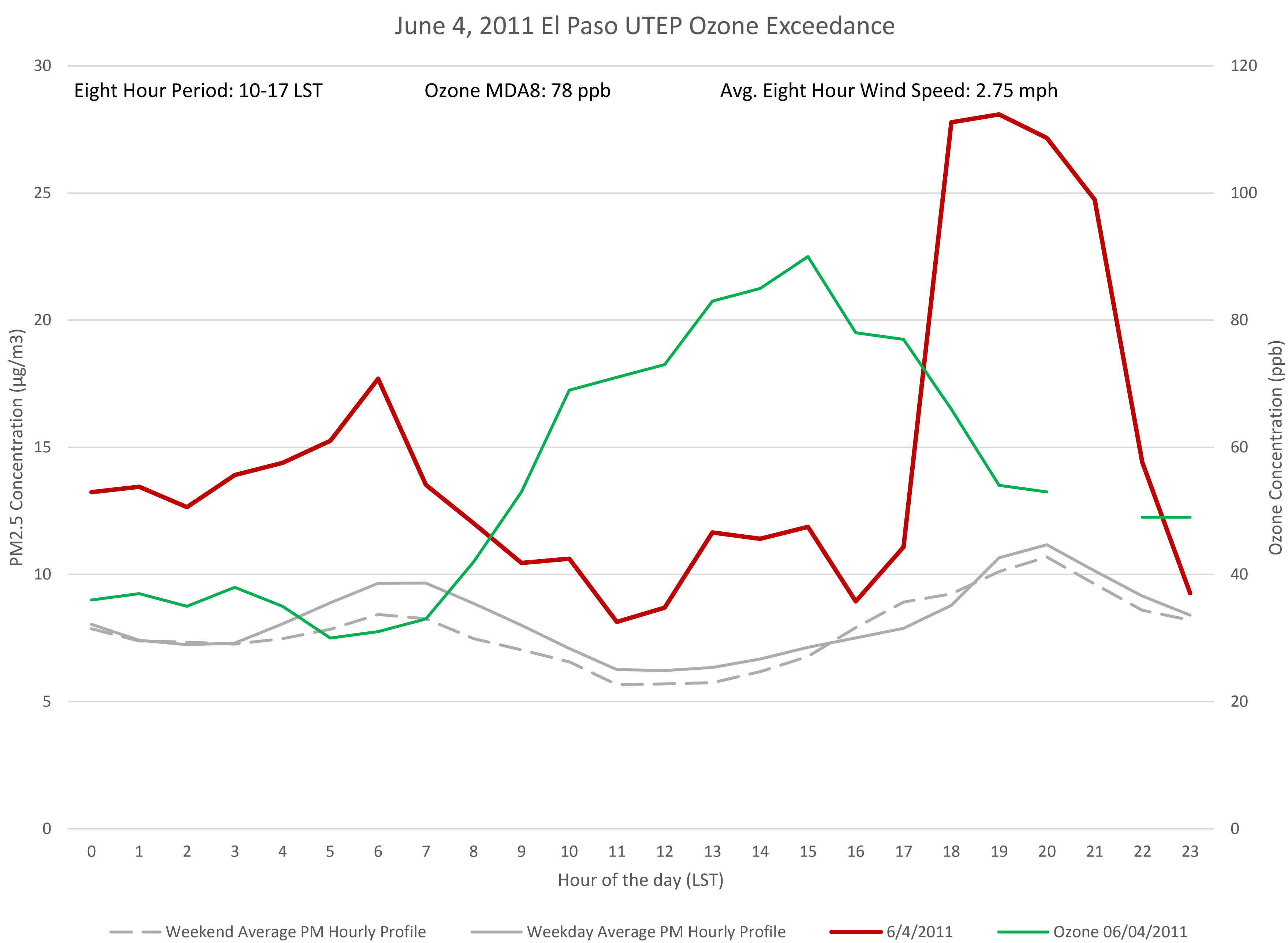
June 29, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 71 ppb
Avg. Eight Hour Wind Speed: 3.33 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/29/2012
Ozone 06/29/2012

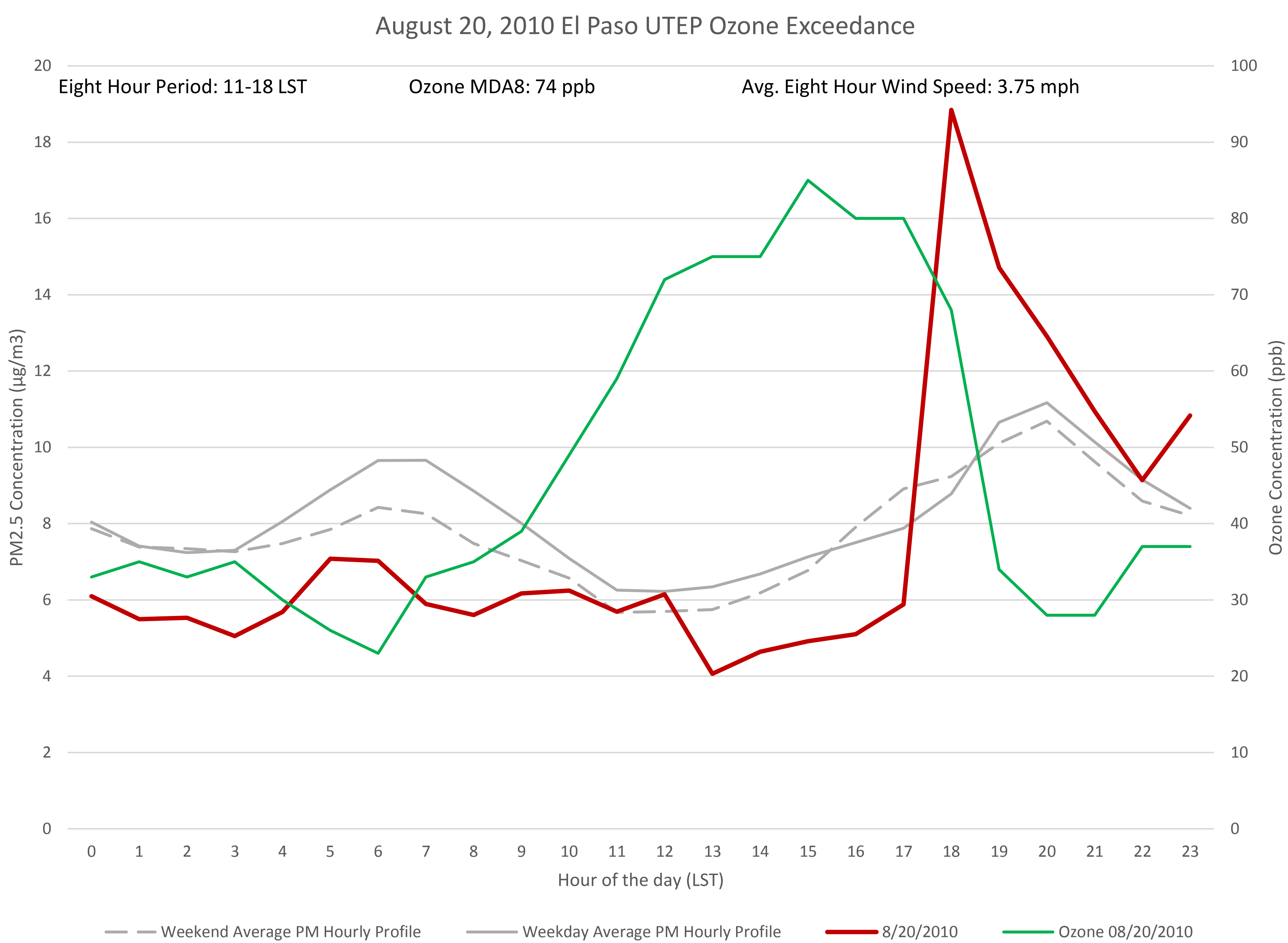

June 28, 2012 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 72 ppb
Avg. Eight Hour Wind Speed: 4.18 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the Day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/28/2012
Ozone 06/28/2012

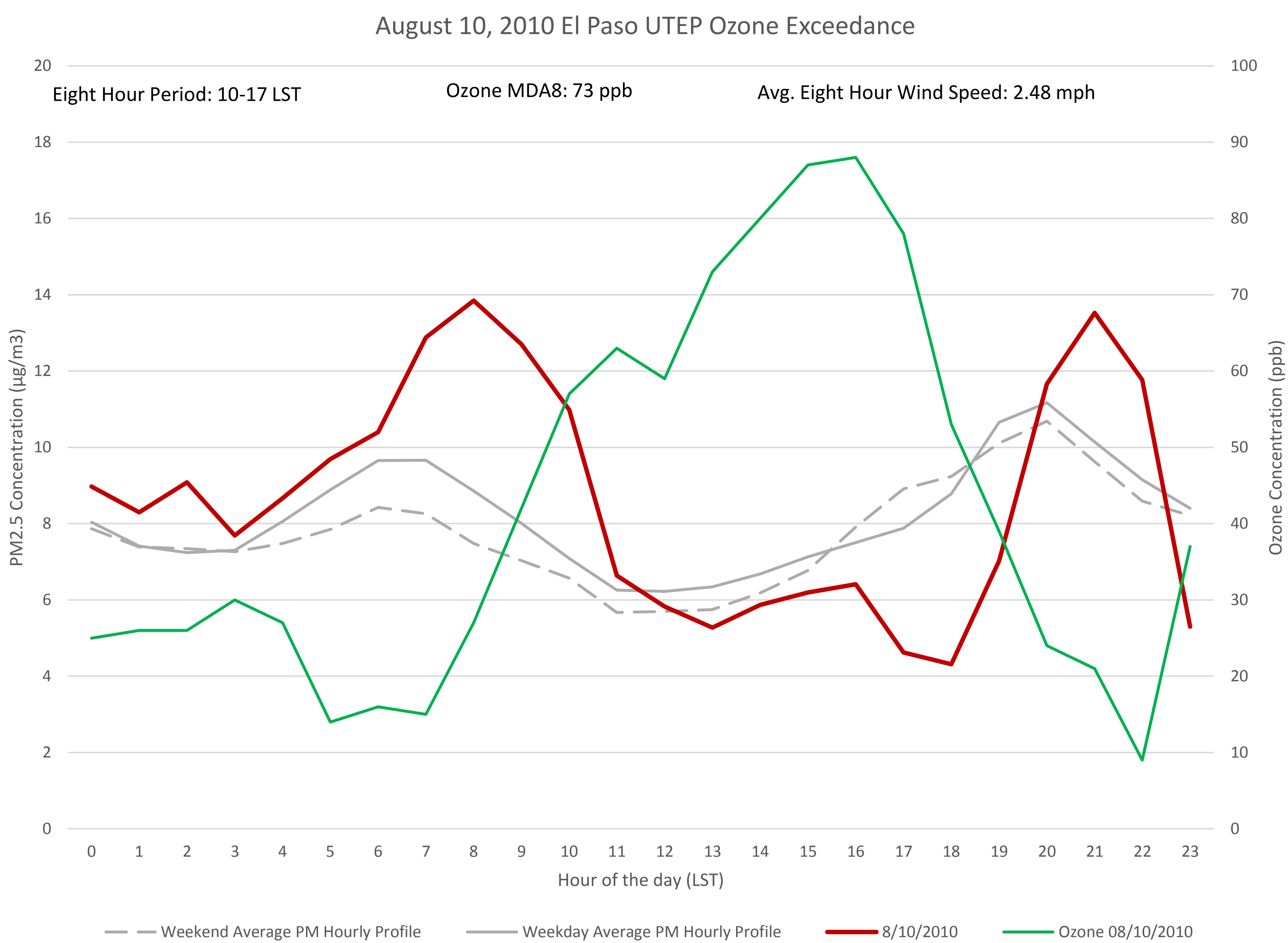


July 20, 2011 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 71 ppb
Avg. Eight Hour Wind Speed: 3.93 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70
80
90
100
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/20/2011
Ozone 07/20/2011

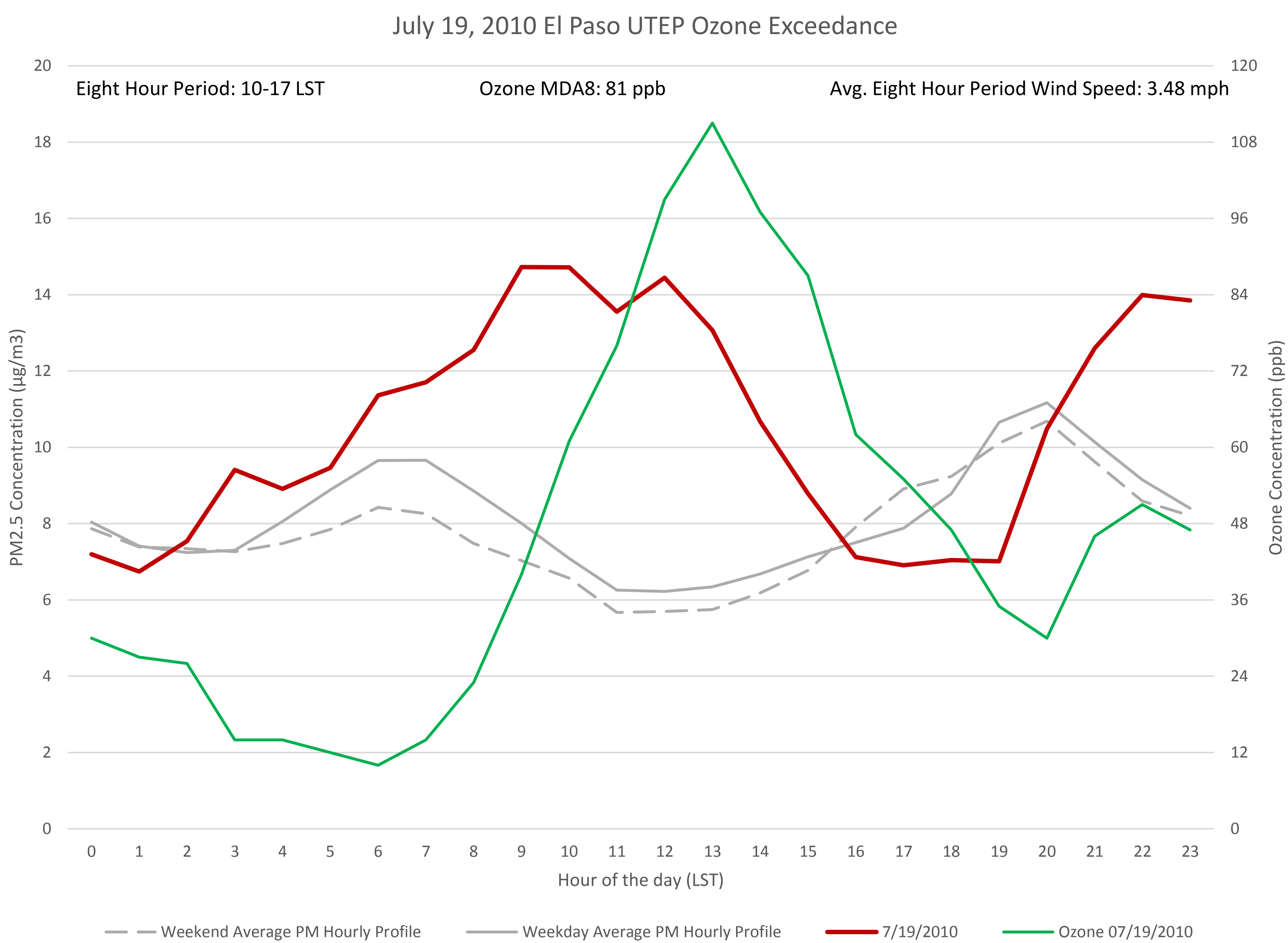

June 22, 2011 El Paso UTEP Ozone Exceedance
Eight Hour Period: 11-18 LST
Ozone MDA8: 78 ppb
Avg. Eight Hour Wind Speed: 2.54 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0
5
10
15
20
25
30
35
0
20
40
60
80
100
120
140
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/22/2011
Ozone 06/22/2011


June 4, 2011 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 78 ppb
Avg. Eight Hour Wind Speed: 2.75 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
30
25
20
15
10
5
0
120
100
80
60
40
20
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
6/4/2011
Ozone 06/04/2011

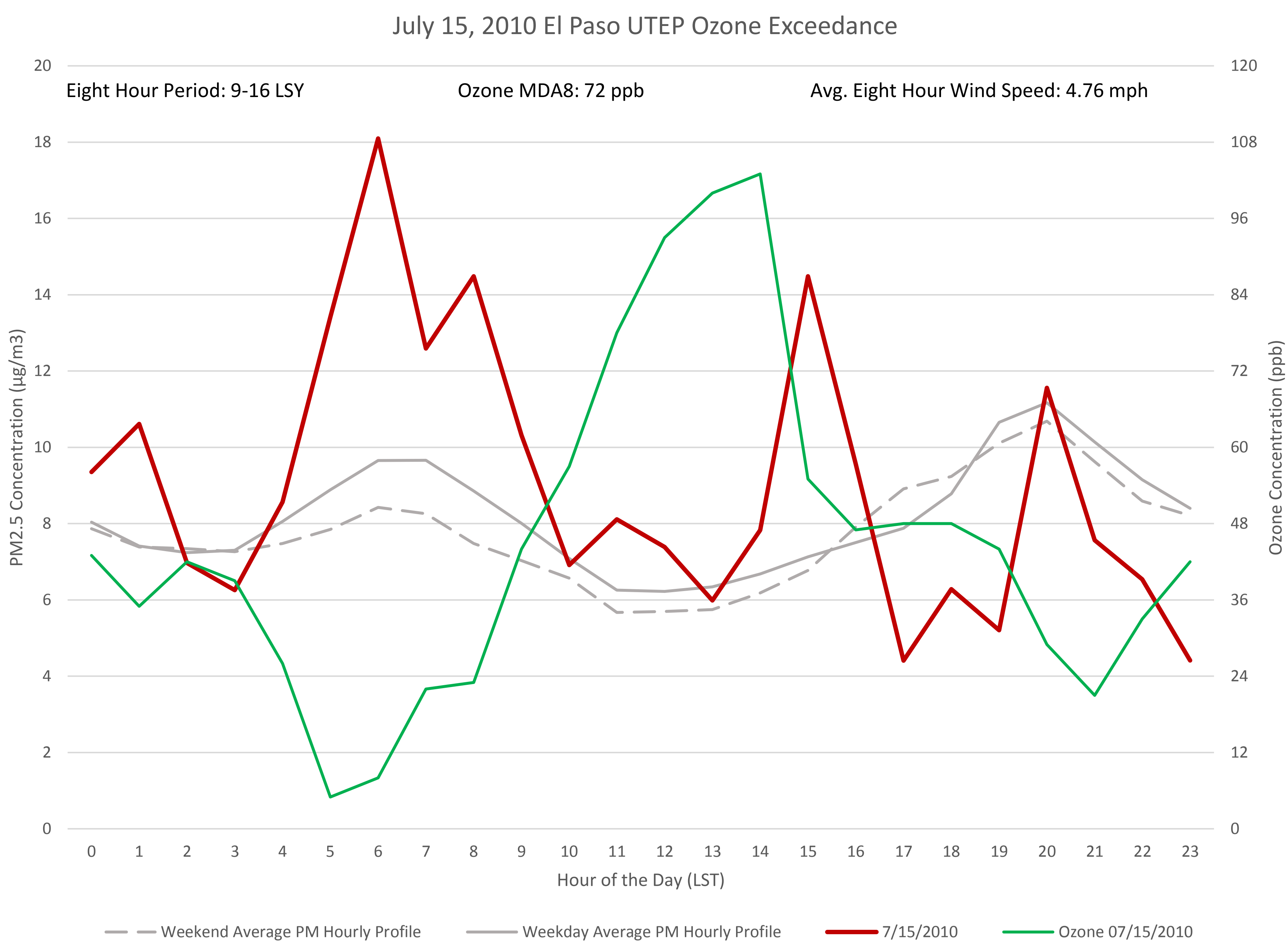

August 20, 2010 El Paso UTEP Ozone Exceedance
Eight Hour Period: 11-18 LST
Ozone MDA8: 74 ppb
Avg. Eight Hour Wind Speed: 3.75 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/20/2010
Ozone 08/20/2010



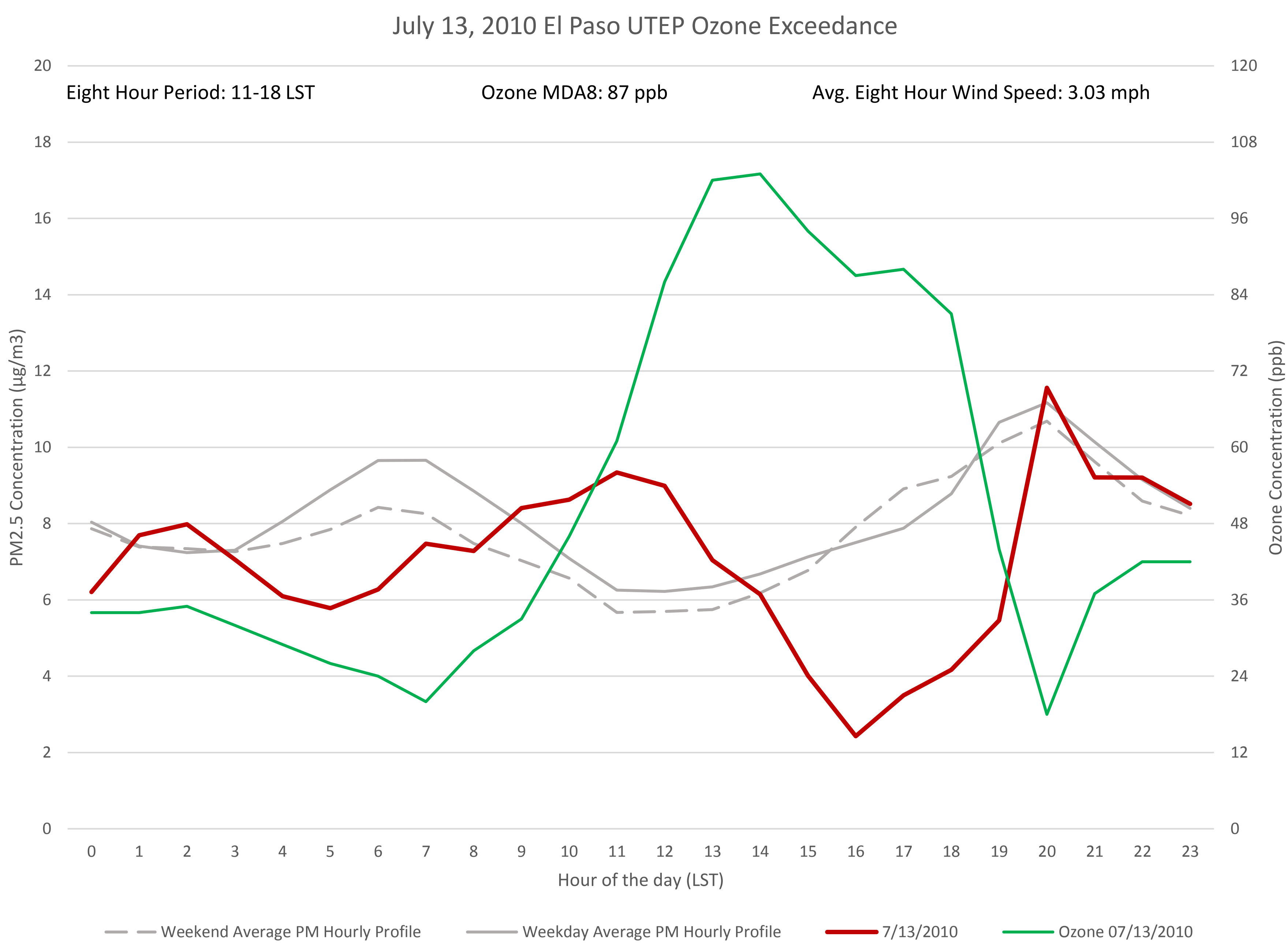
August 10, 2010 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 73 ppb
Avg. Eight Hour Wind Speed: 2.48 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
0 2 4 6 8 10 12 14 16 18 20
0 10 20 30 40 50 60 70 80 90 100
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
8/10/2010
Ozone 08/10/2010



July 19, 2010 El Paso UTEP Ozone Exceedance
Eight Hour Period: 10-17 LST
Ozone MDA8: 81 ppb
Avg. Eight Hour Period Wind Speed: 3.48 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
0
2
4
6
8
10
12
14
16
18
20
0
12
24
36
48
60
72
84
96
108
120
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/19/2010
Ozone 07/19/2010

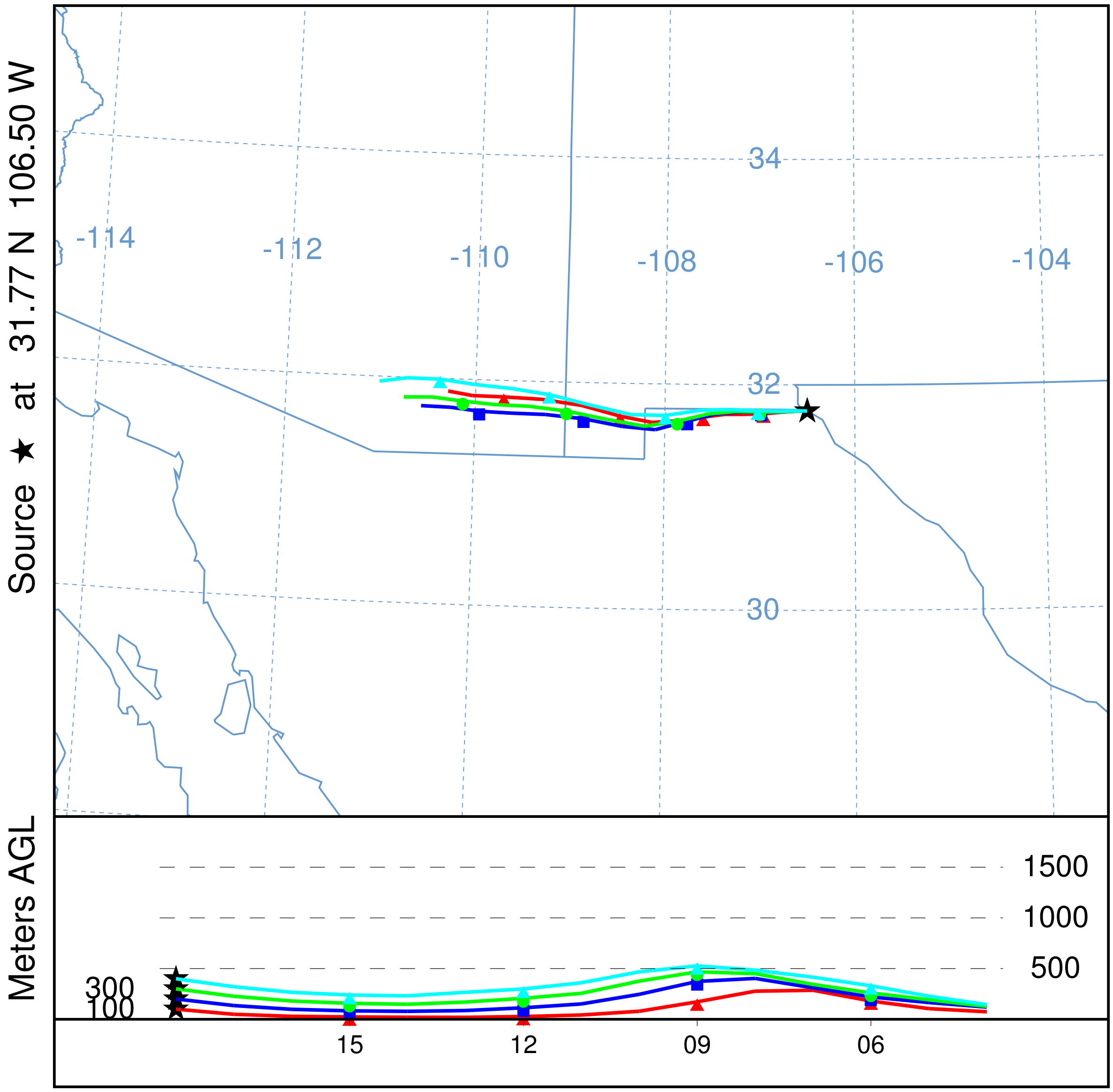


July 15, 2010 El Paso UTEP Ozone Exceedance
Eight Hour Period: 9-16 LSY
Ozone MDA8: 72 ppb
Avg. Eight Hour Wind Speed: 4.76 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the Day (LST)
0 2 4 6 8 10 12 14 16 18 20
0 12 24 36 48 60 72 84 96 108 120
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/15/2010
Ozone 07/15/2010

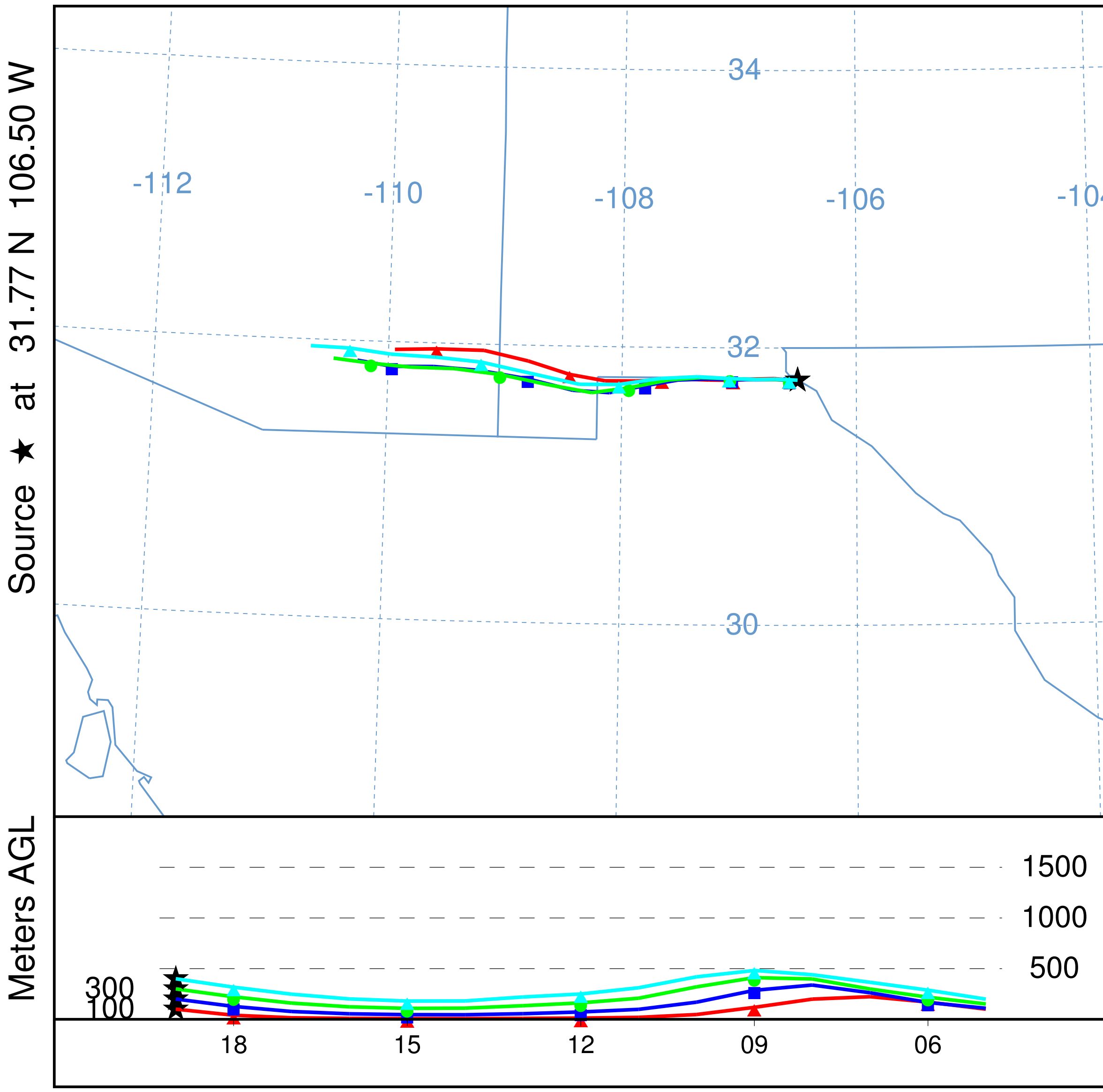

July 13, 2010 El Paso UTEP Ozone Exceedance
Eight Hour Period: 11-18 LST
Ozone MDA8: 87 ppb
Avg. Eight Hour Wind Speed: 3.03 mph
PM2.5 Concentration (µg/m3)
Ozone Concentration (ppb)
Hour of the day (LST)
Weekend Average PM Hourly Profile
Weekday Average PM Hourly Profile
7/13/2010
Ozone 07/13/2010

APPENDIX B: EL PASO UTEP HYSPLIT BACK TRAJECTORIES

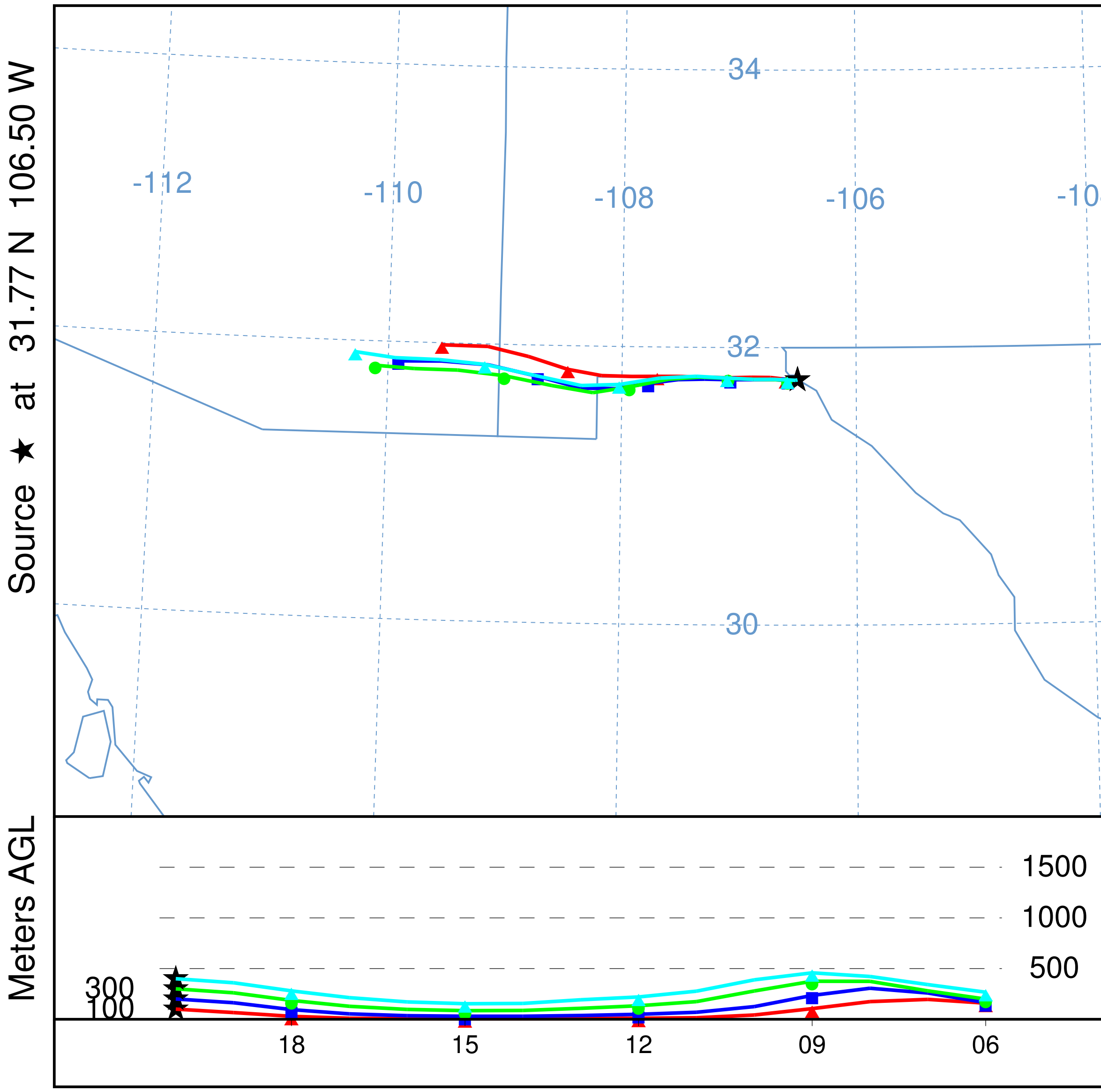
NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 21 Jun 15
NARR Meteorological Data



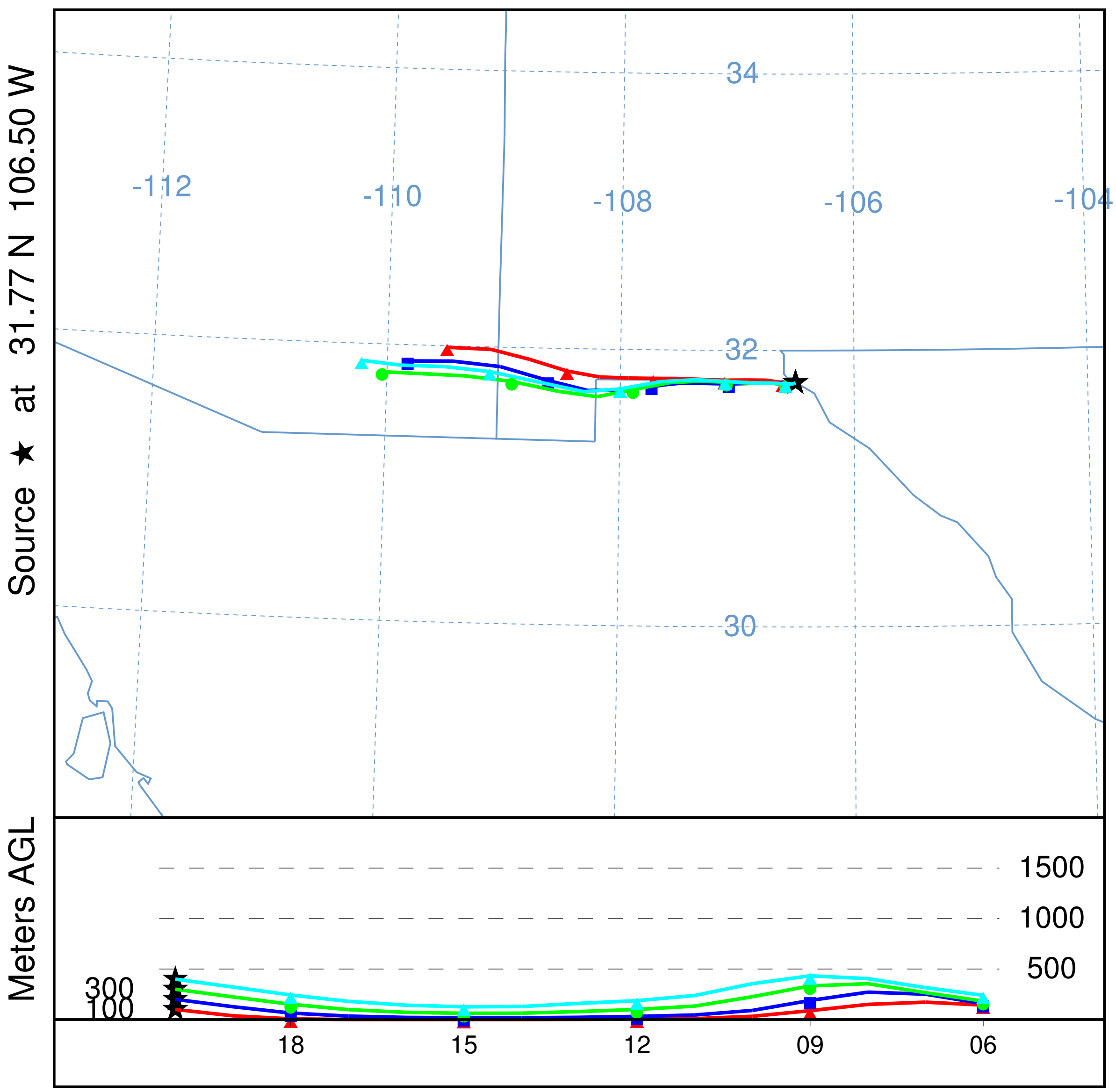
NOAA HYSPLIT MODEL
Backward trajectories ending at 1900 UTC 21 Jun 15
NARR Meteorological Data



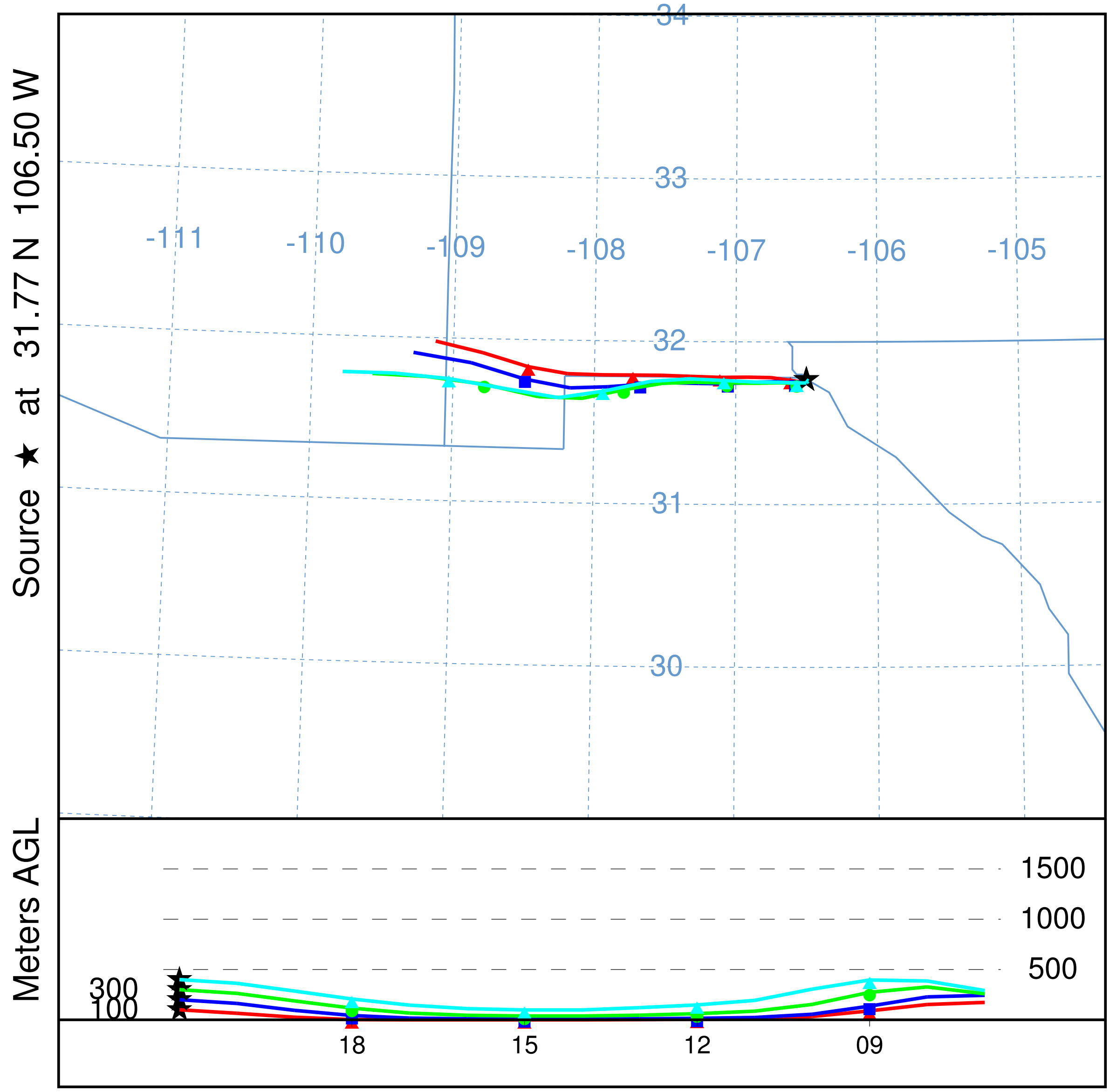
NOAA HYSPLIT MODEL
Backward trajectories ending at 1930 UTC 21 Jun 15
NARR Meteorological Data



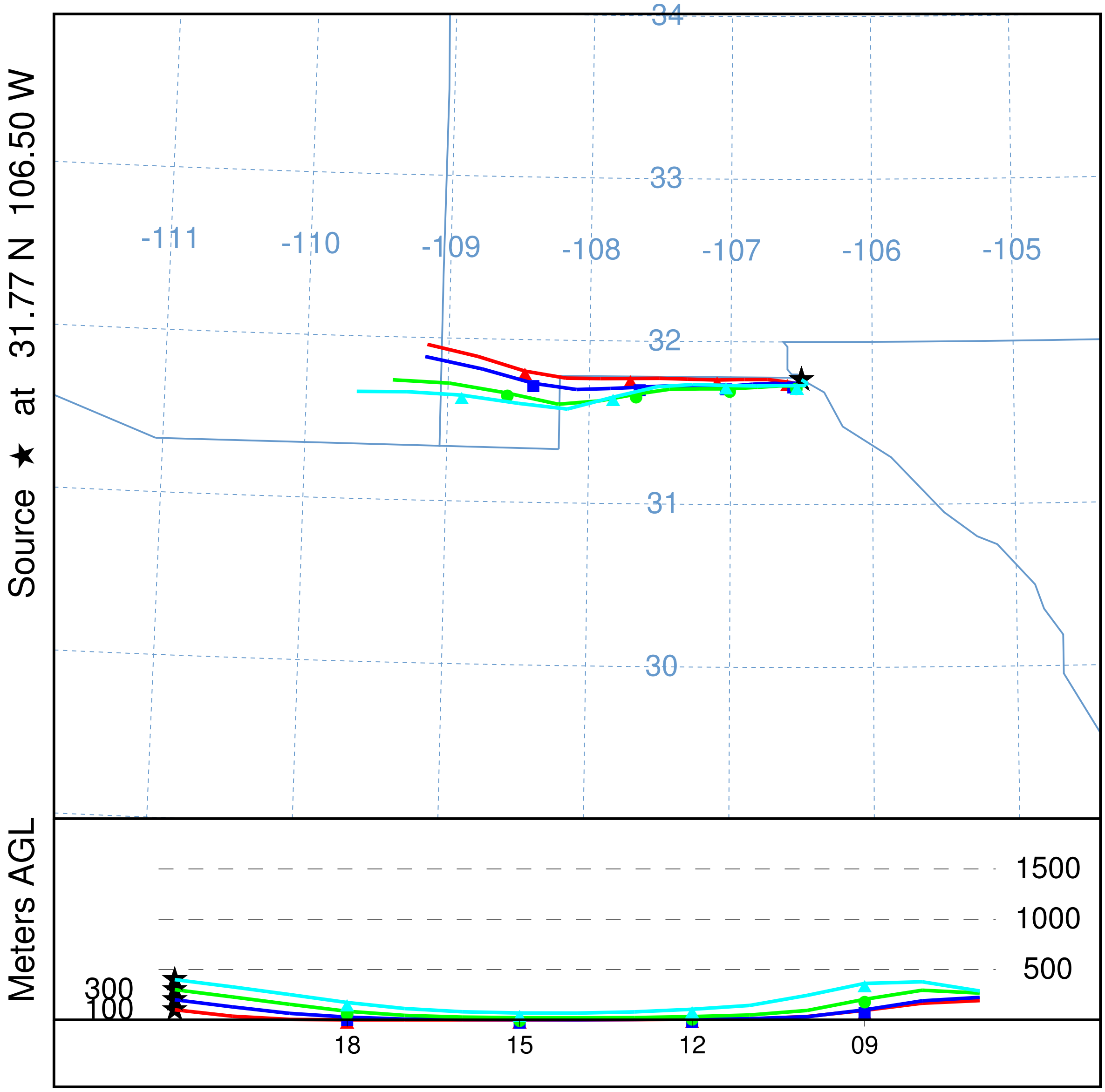
NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 21 Jun 15
NARR Meteorological Data



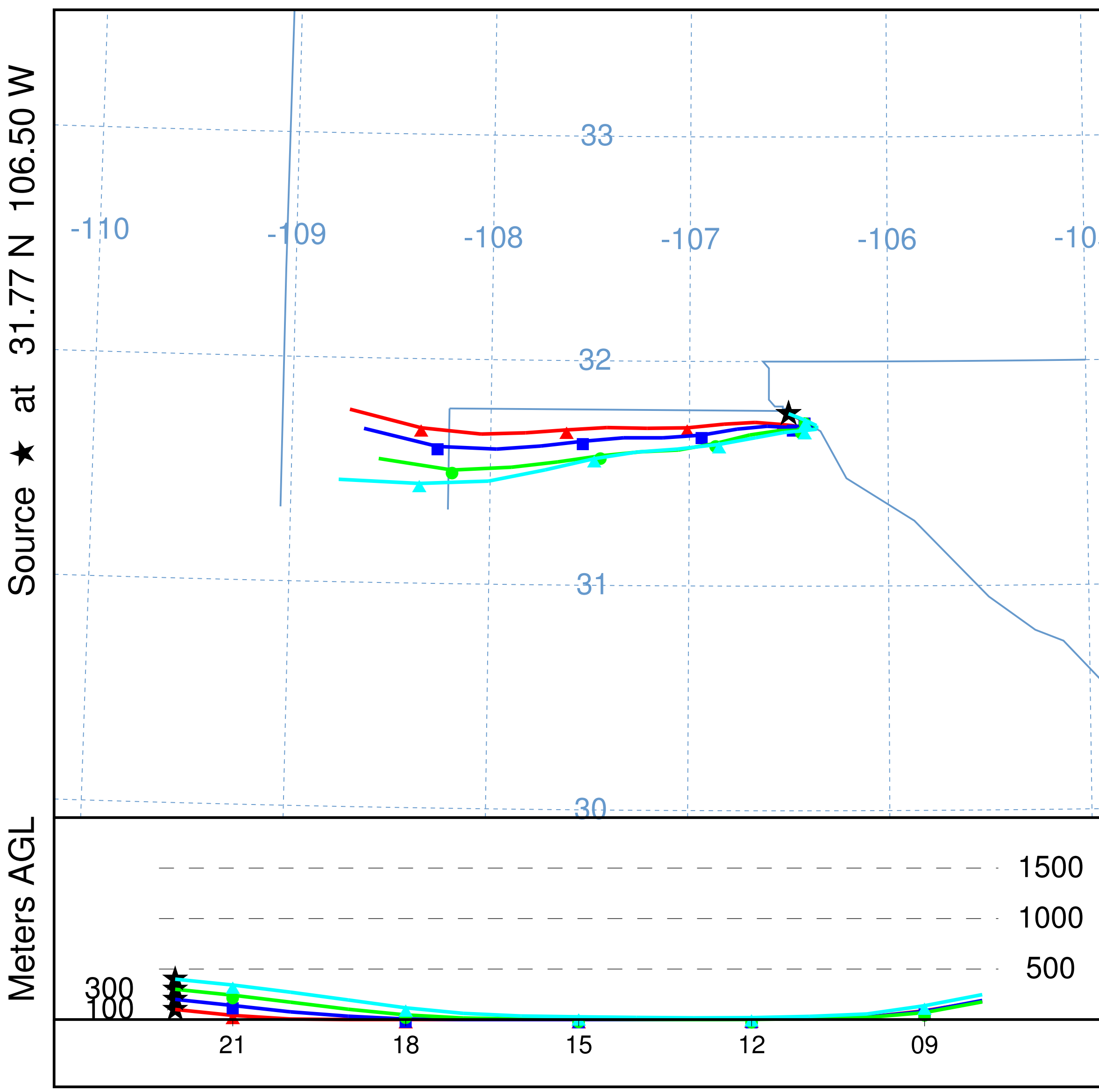
NOAA HYSPLIT MODEL
Backward trajectories ending at 2030 UTC 21 Jun 15
NARR Meteorological Data



NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 21 Jun 15
NARR Meteorological Data



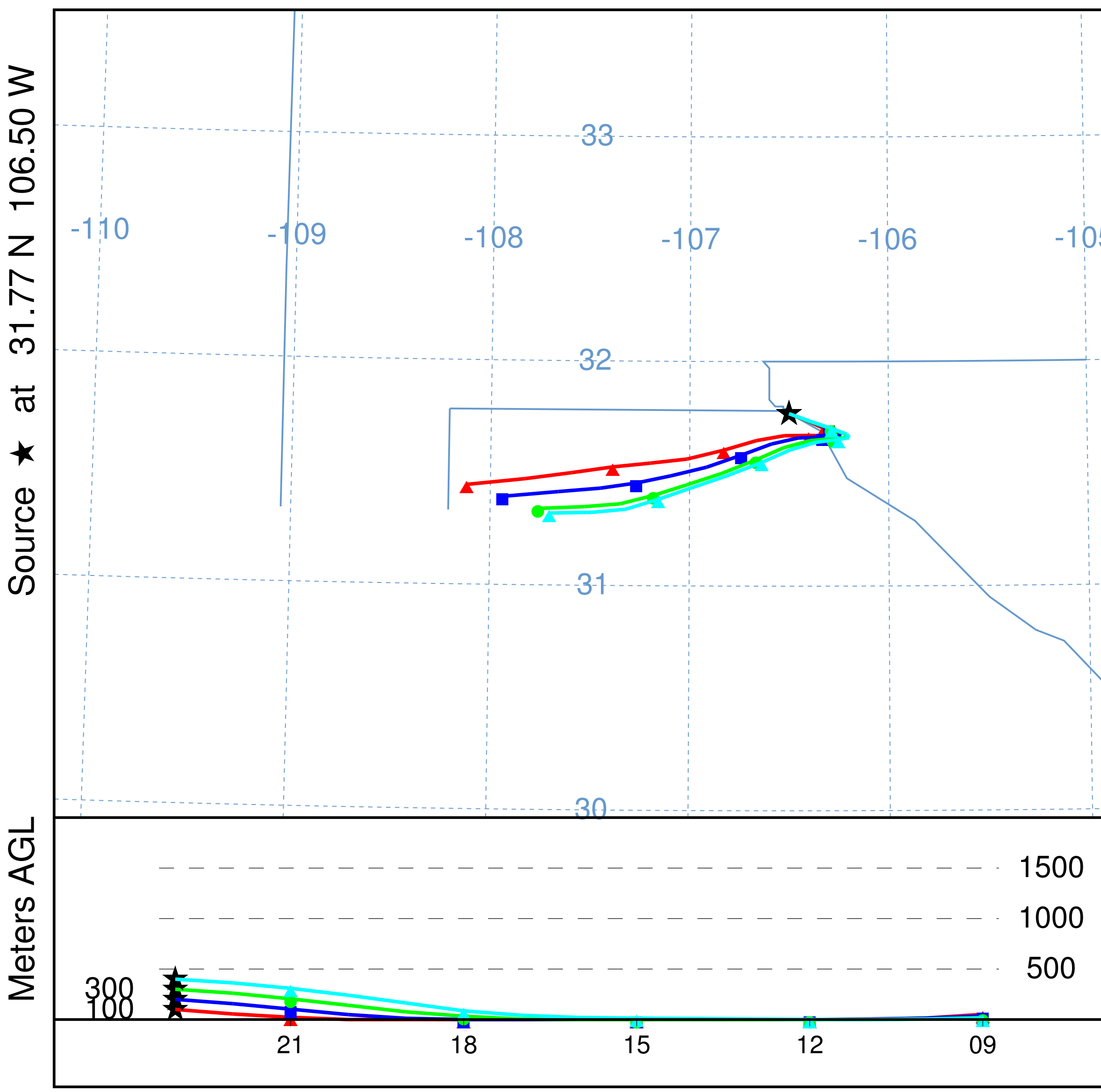
NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 21 Jun 15
NARR Meteorological Data



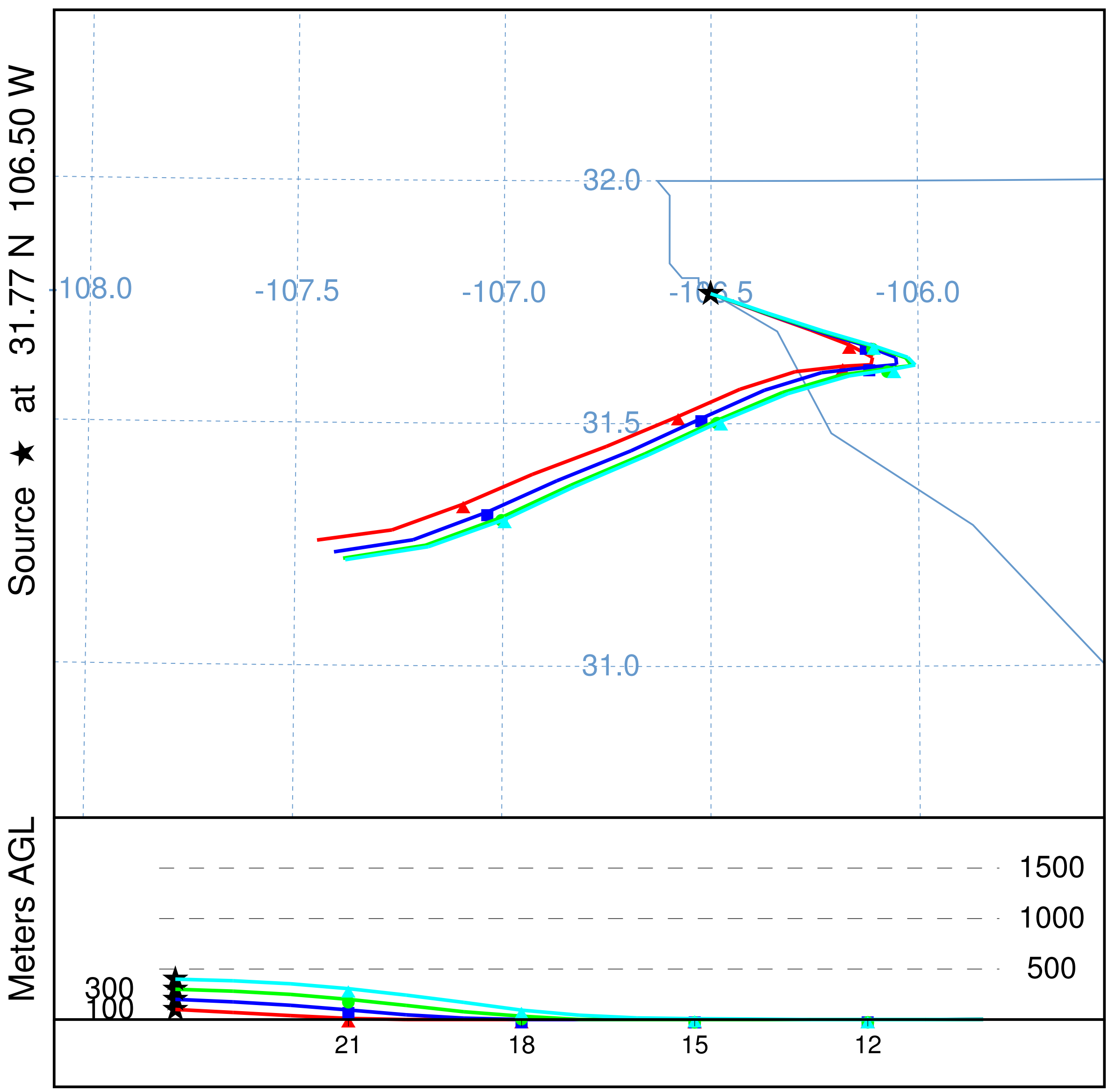
NOAA HYSPLIT MODEL

Backward trajectories ending at 2300 UTC 21 Jun 15

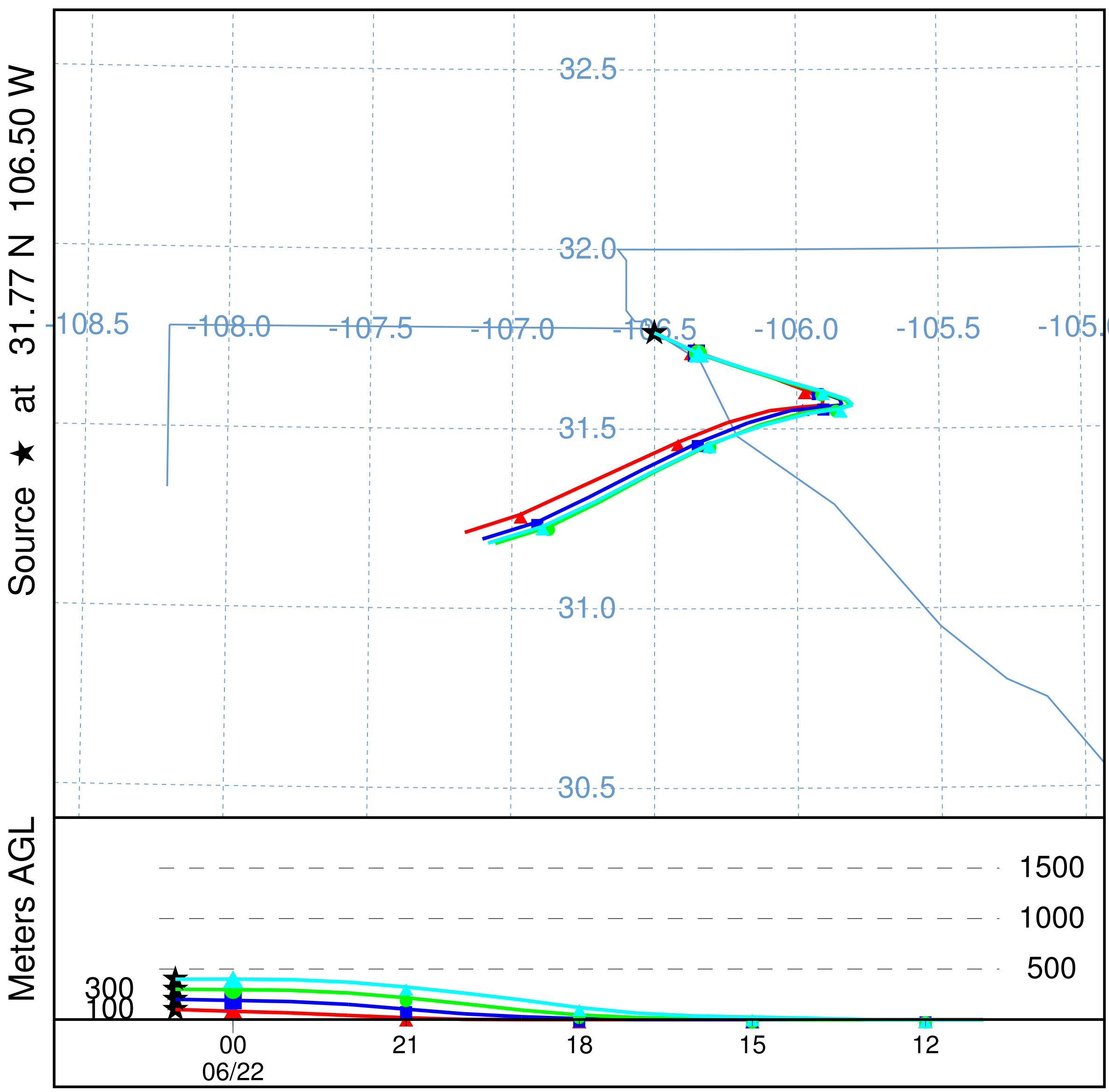
NARR Meteorological Data



NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 22 Jun 15
NARR Meteorological Data

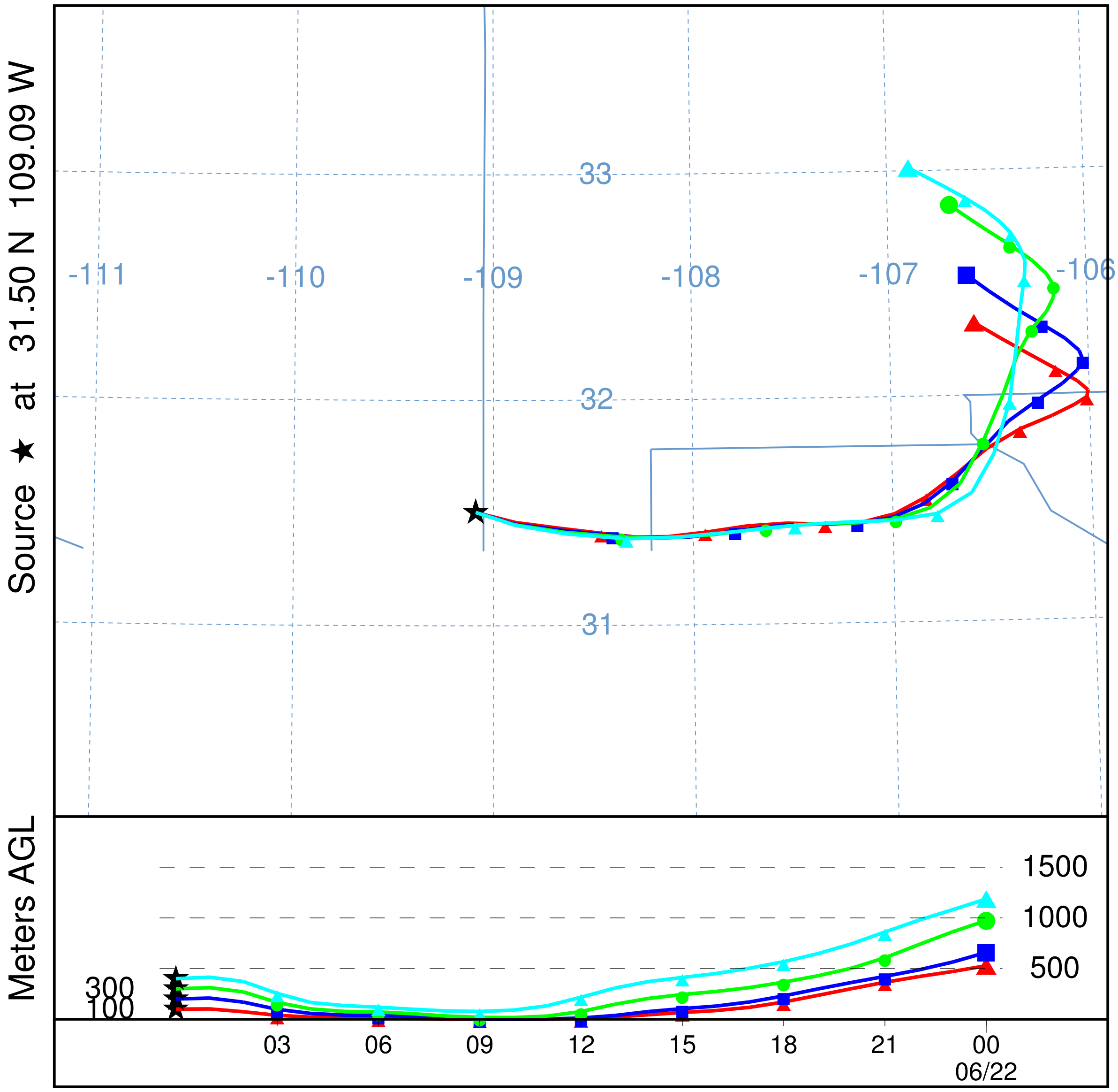


NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 22 Jun 15
NARR Meteorological Data

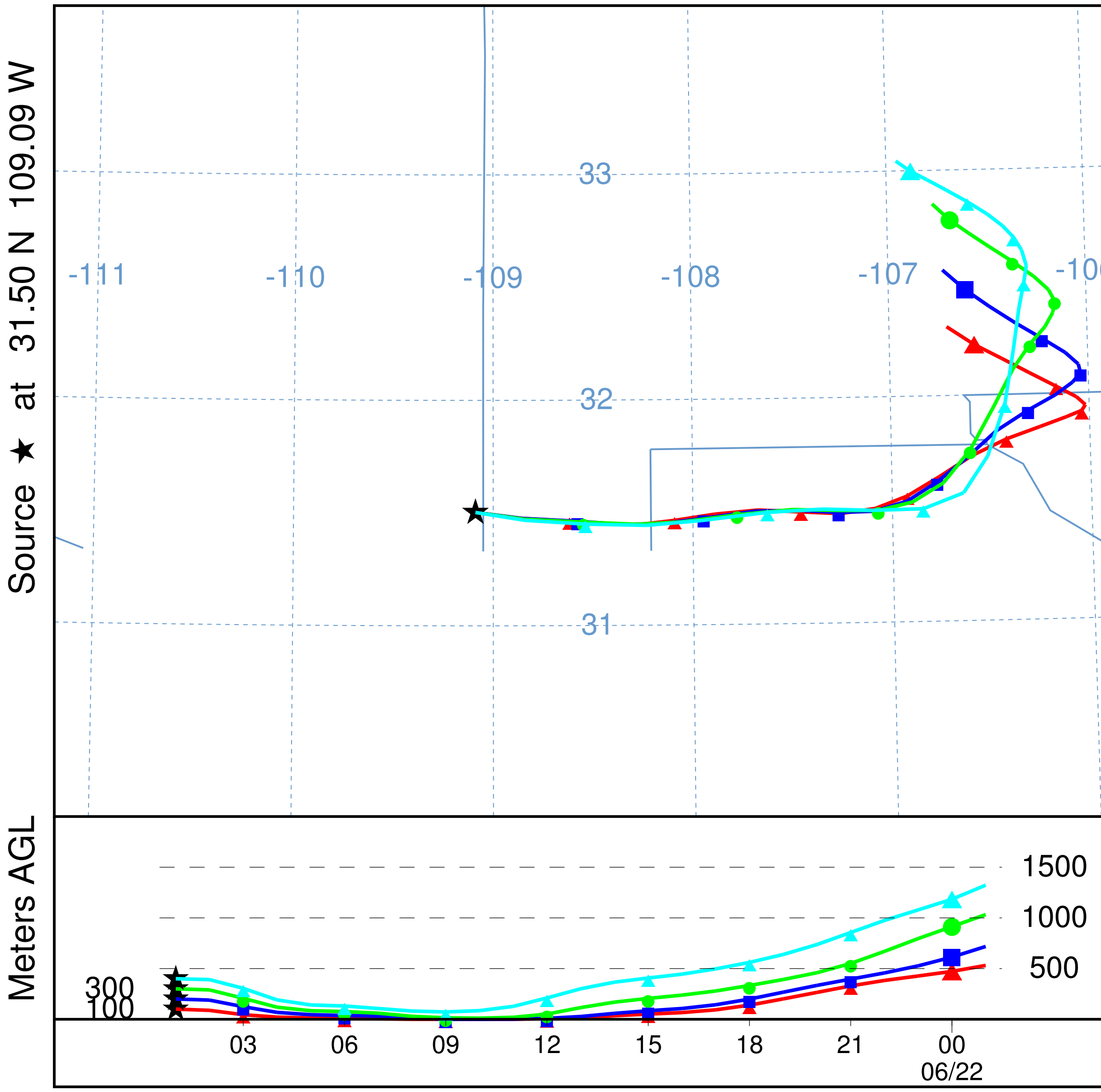


APPENDIX C: HOG FIRE FORWARD HYSPLIT TRAJECTORIES

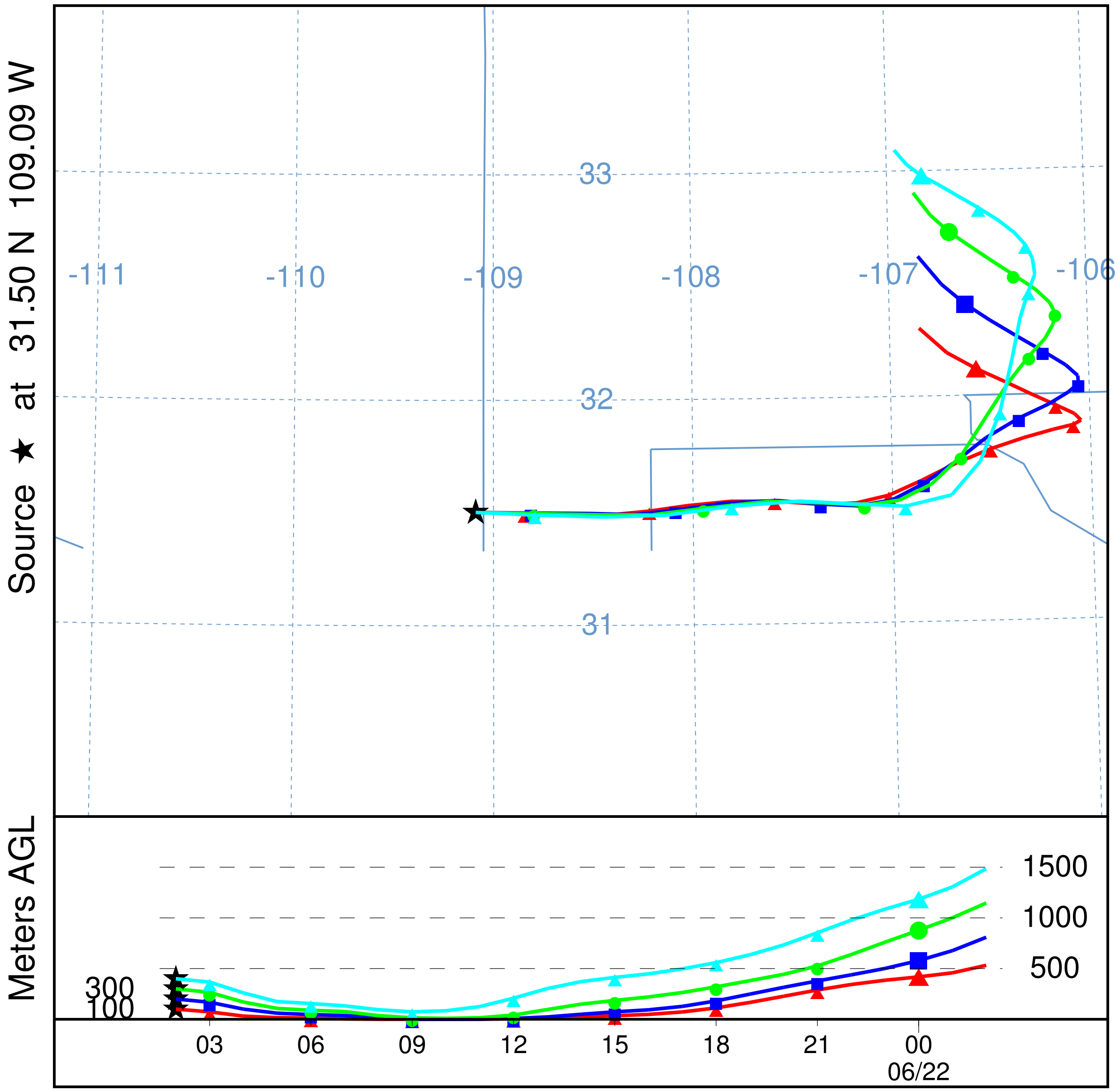
NOAA HYSPLIT MODEL
Forward trajectories starting at 0000 UTC 21 Jun 15
NARR Meteorological Data

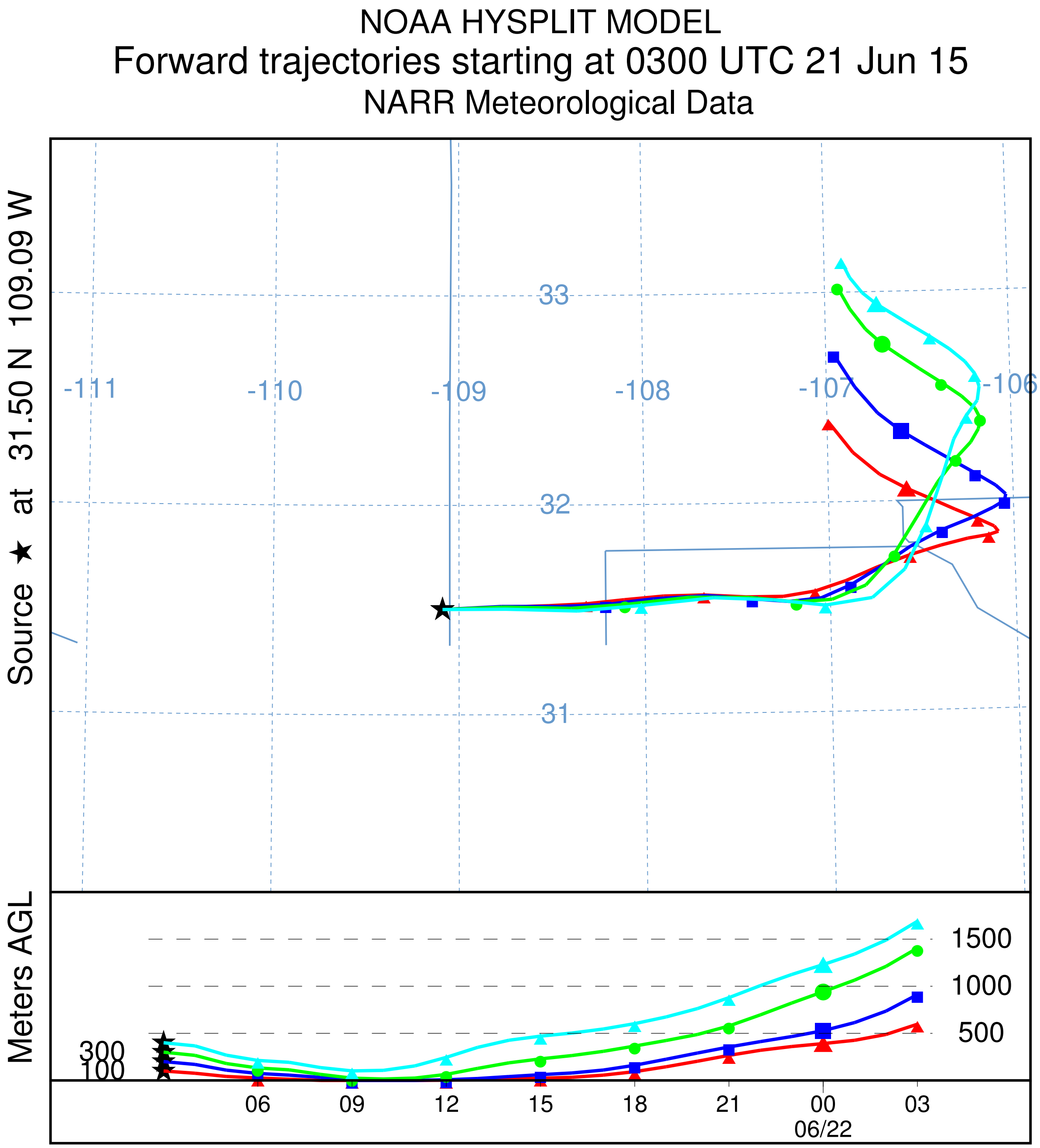


NOAA HYSPLIT MODEL
Forward trajectories starting at 0100 UTC 21 Jun 15
NARR Meteorological Data



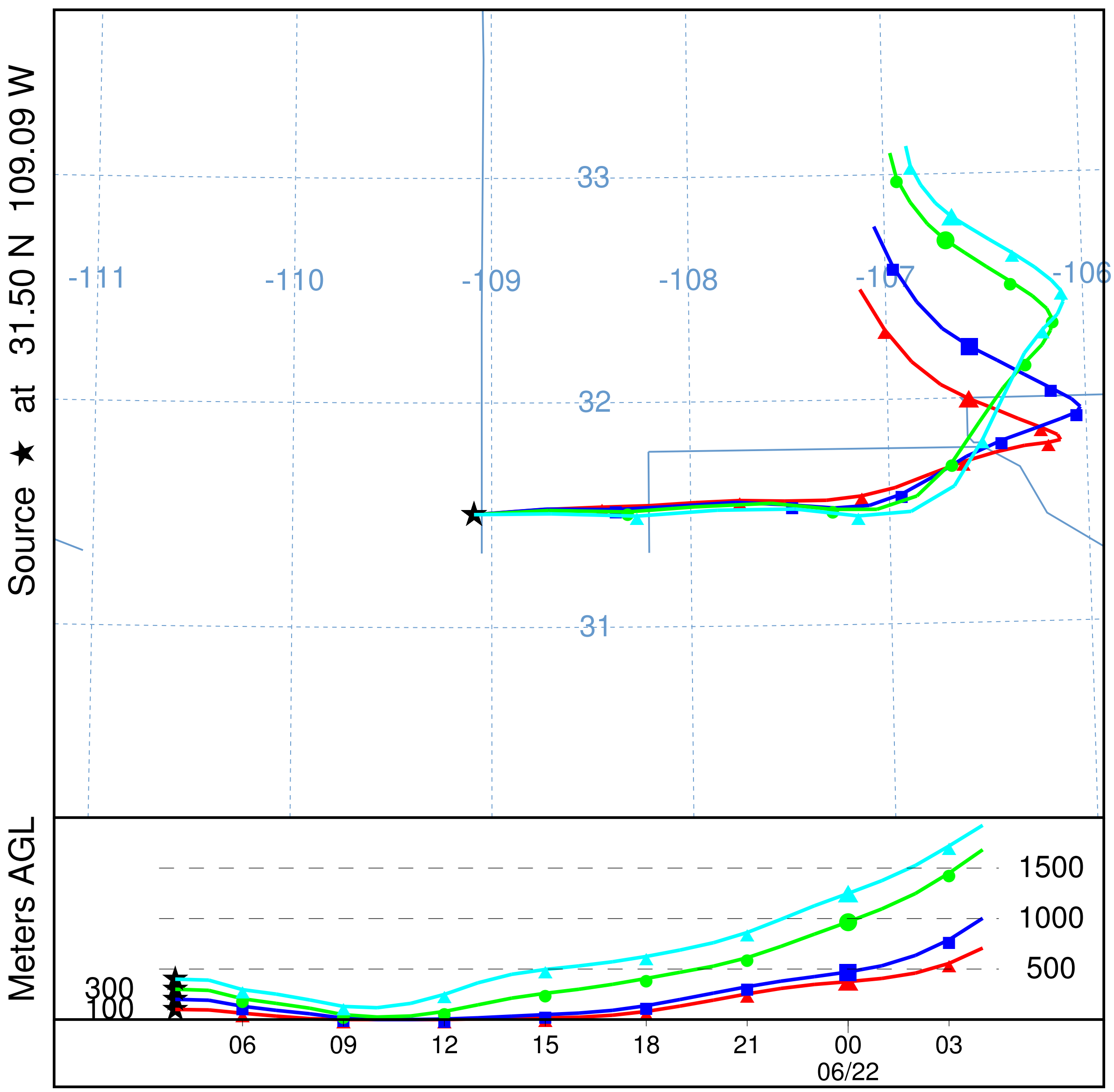
NOAA HYSPLIT MODEL
Forward trajectories starting at 0200 UTC 21 Jun 15
NARR Meteorological Data



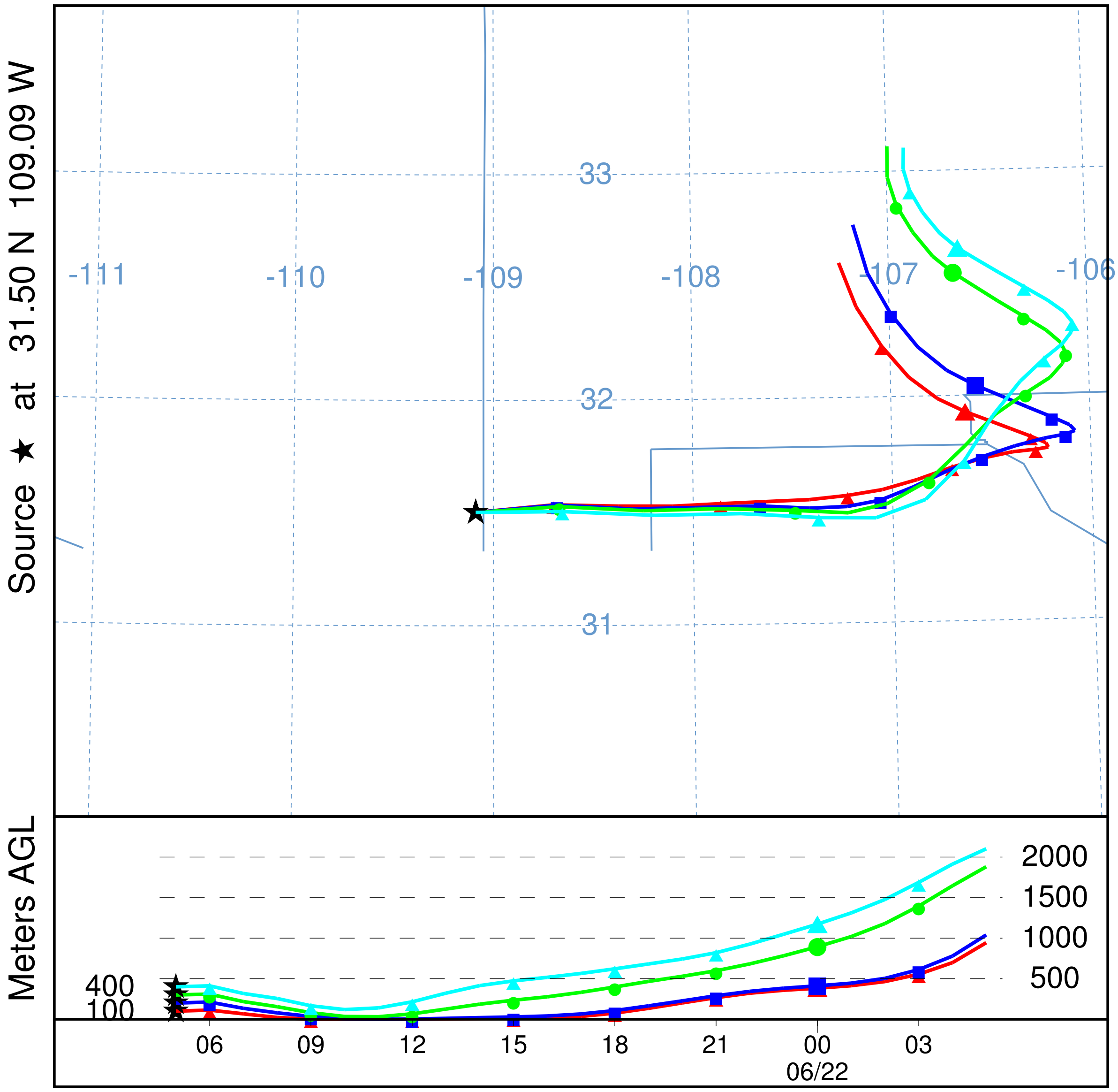


NOAA HYSPLIT MODEL
Forward trajectories starting at 0300 UTC 21 Jun 15
NARR Meteorological Data
Source ★ at 31.50 N 109.09 W
-111
-110
-109
-108
-107
-106
33
32
31
Meters AGL
1500
1000
500
300
100
06
09
12
15
18
21
00
06/22
03

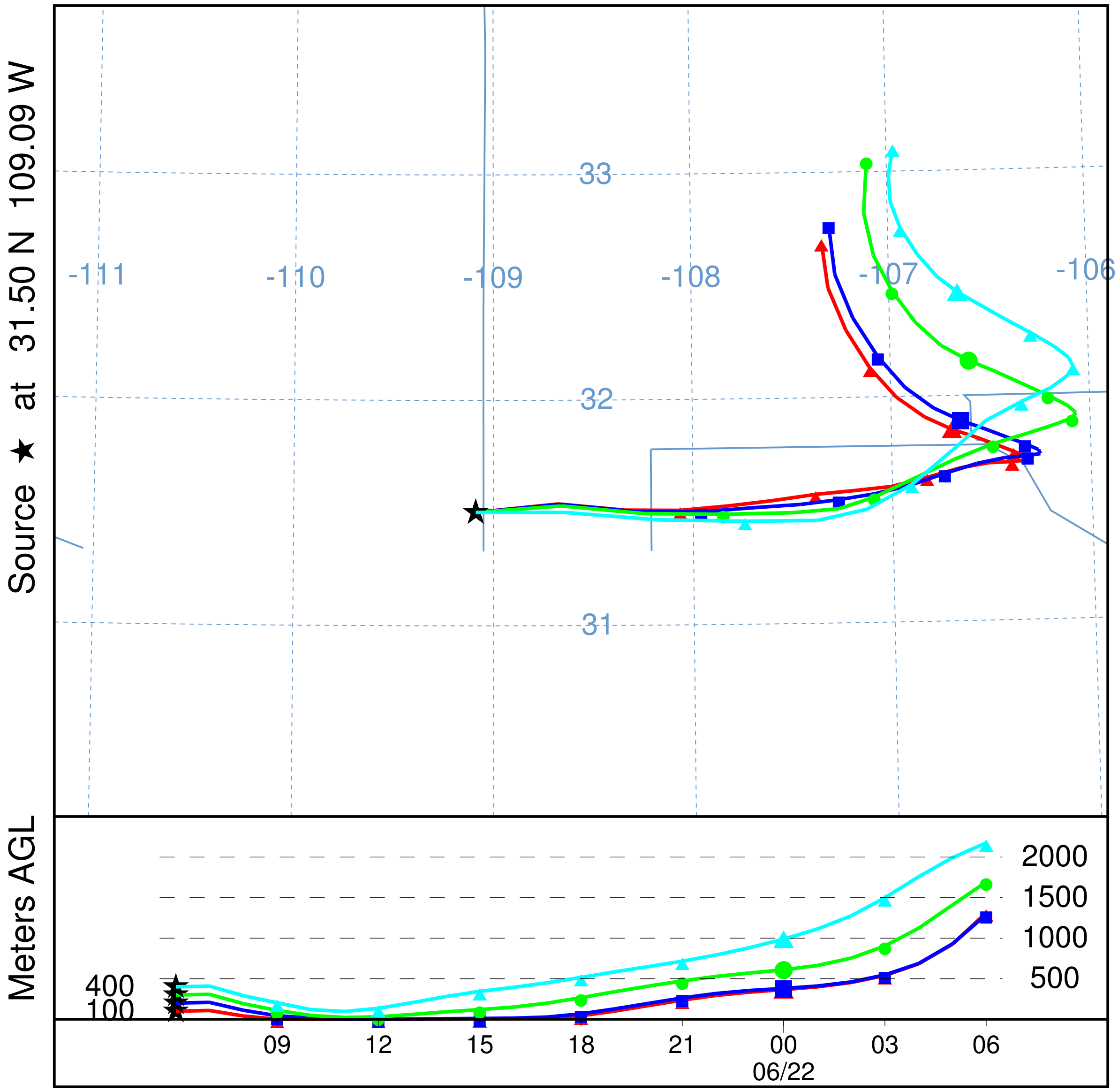
NOAA HYSPLIT MODEL
Forward trajectories starting at 0400 UTC 21 Jun 15
NARR Meteorological Data



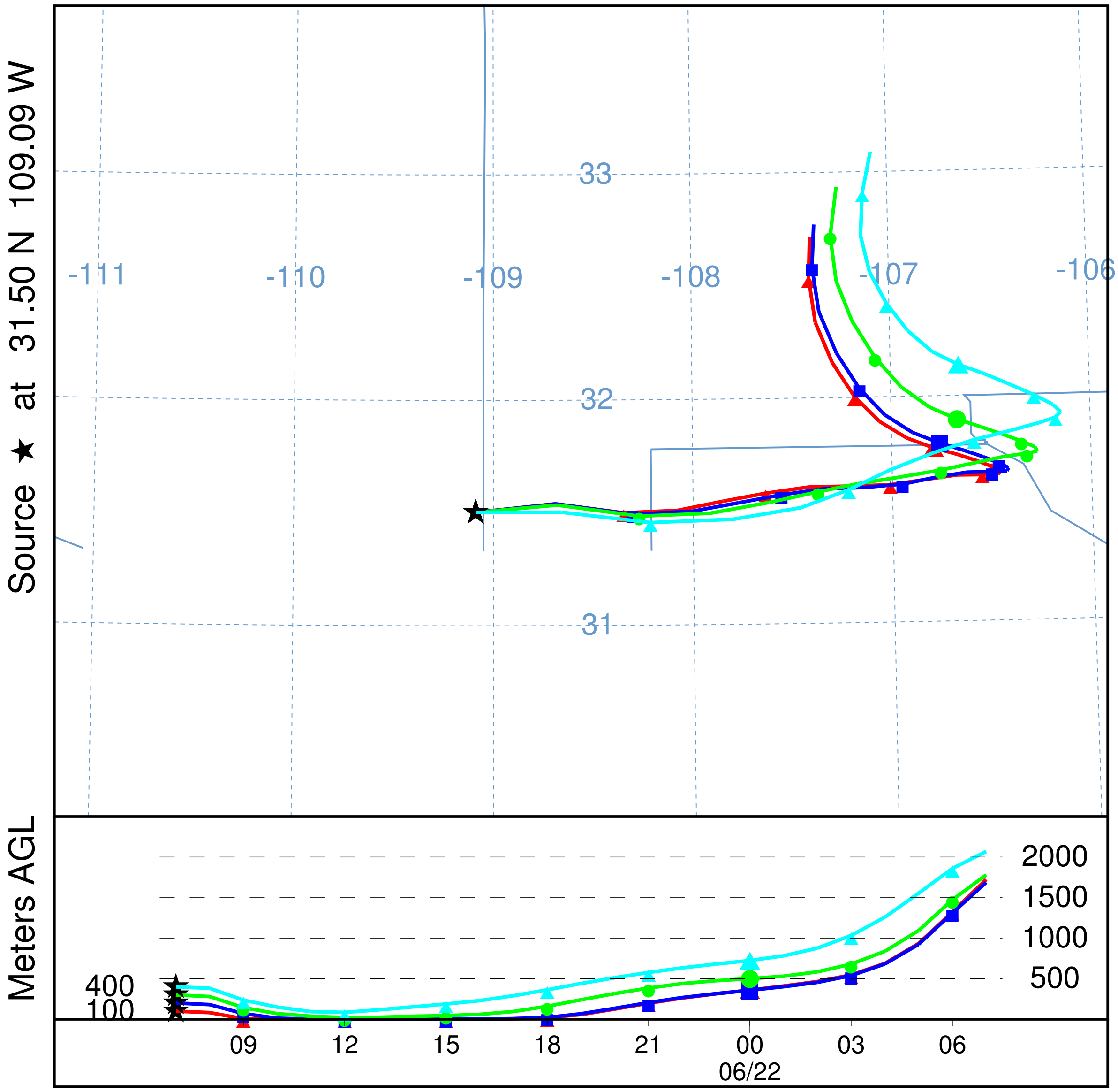
NOAA HYSPLIT MODEL
Forward trajectories starting at 0500 UTC 21 Jun 15
NARR Meteorological Data

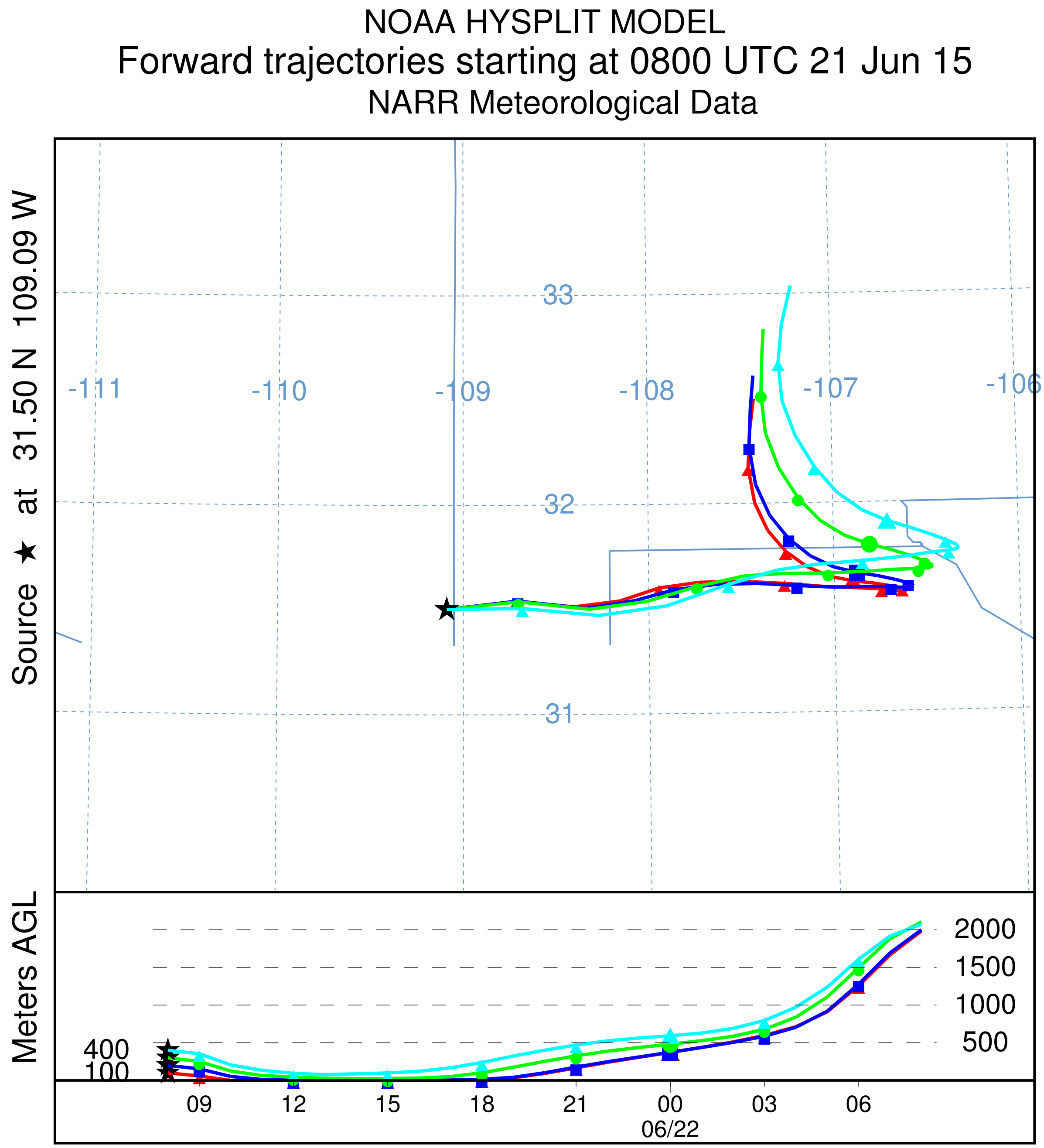


NOAA HYSPLIT MODEL
Forward trajectories starting at 0600 UTC 21 Jun 15
NARR Meteorological Data



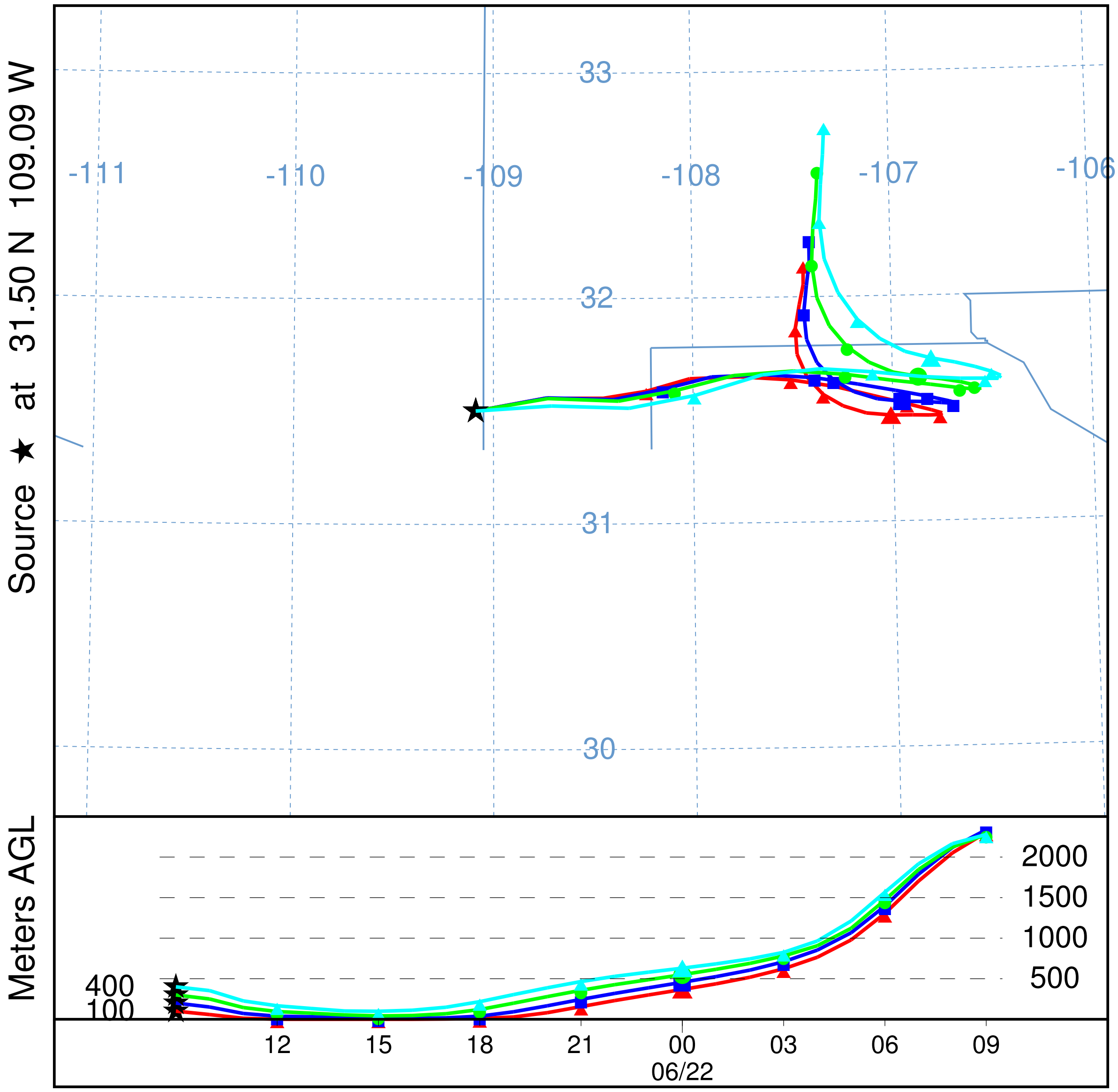
NOAA HYSPLIT MODEL
Forward trajectories starting at 0700 UTC 21 Jun 15
NARR Meteorological Data

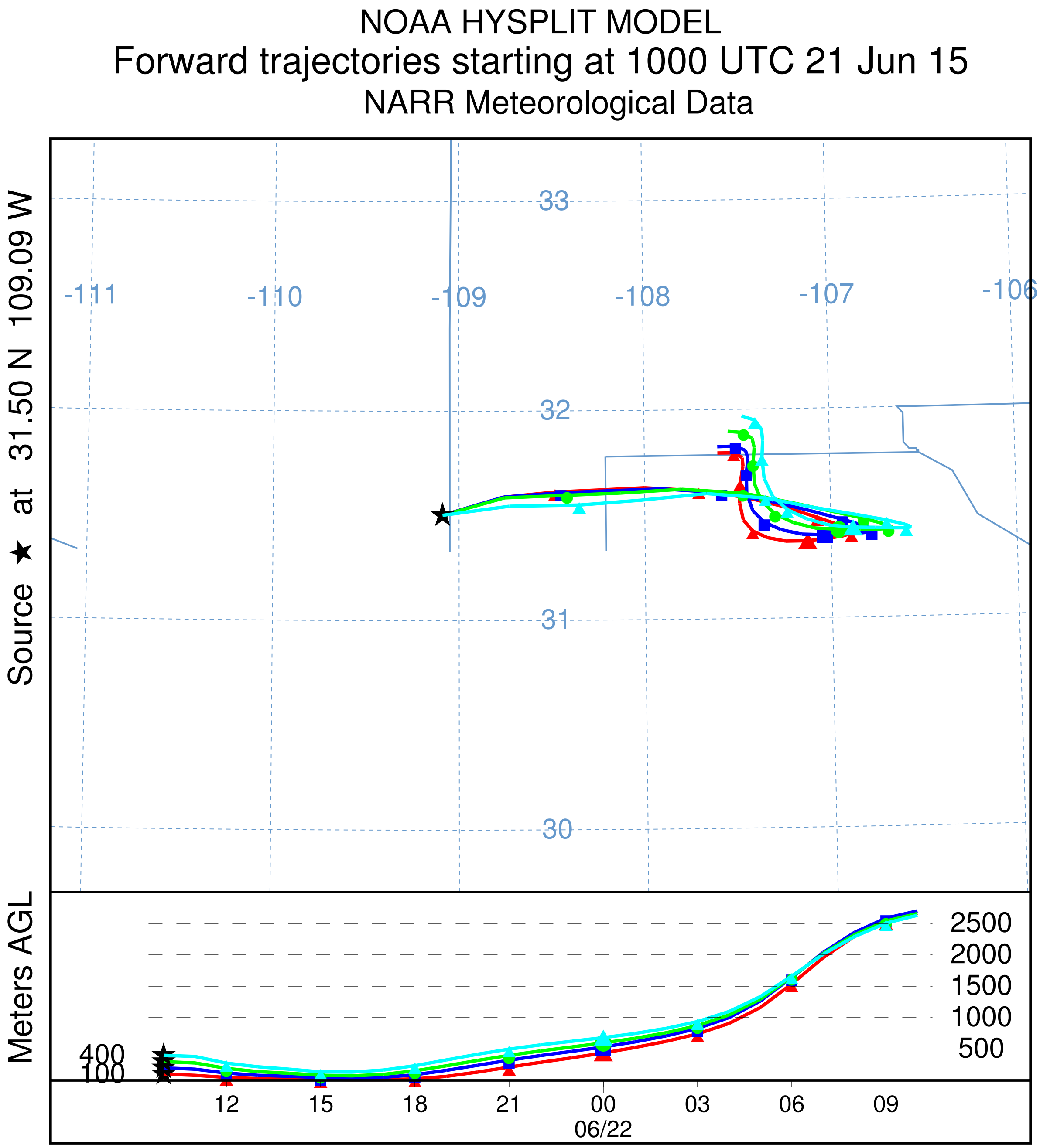




NOAA HYSPLIT MODEL
Forward trajectories starting at 0800 UTC 21 Jun 15
NARR Meteorological Data
Source ★ at 31.50 N 109.09 W
-111
-110
-109
-108
-107
-106
33
32
31
Meters AGL
2000
1500
1000
500
400
100
09
12
15
18
21
00
03
06
06/22

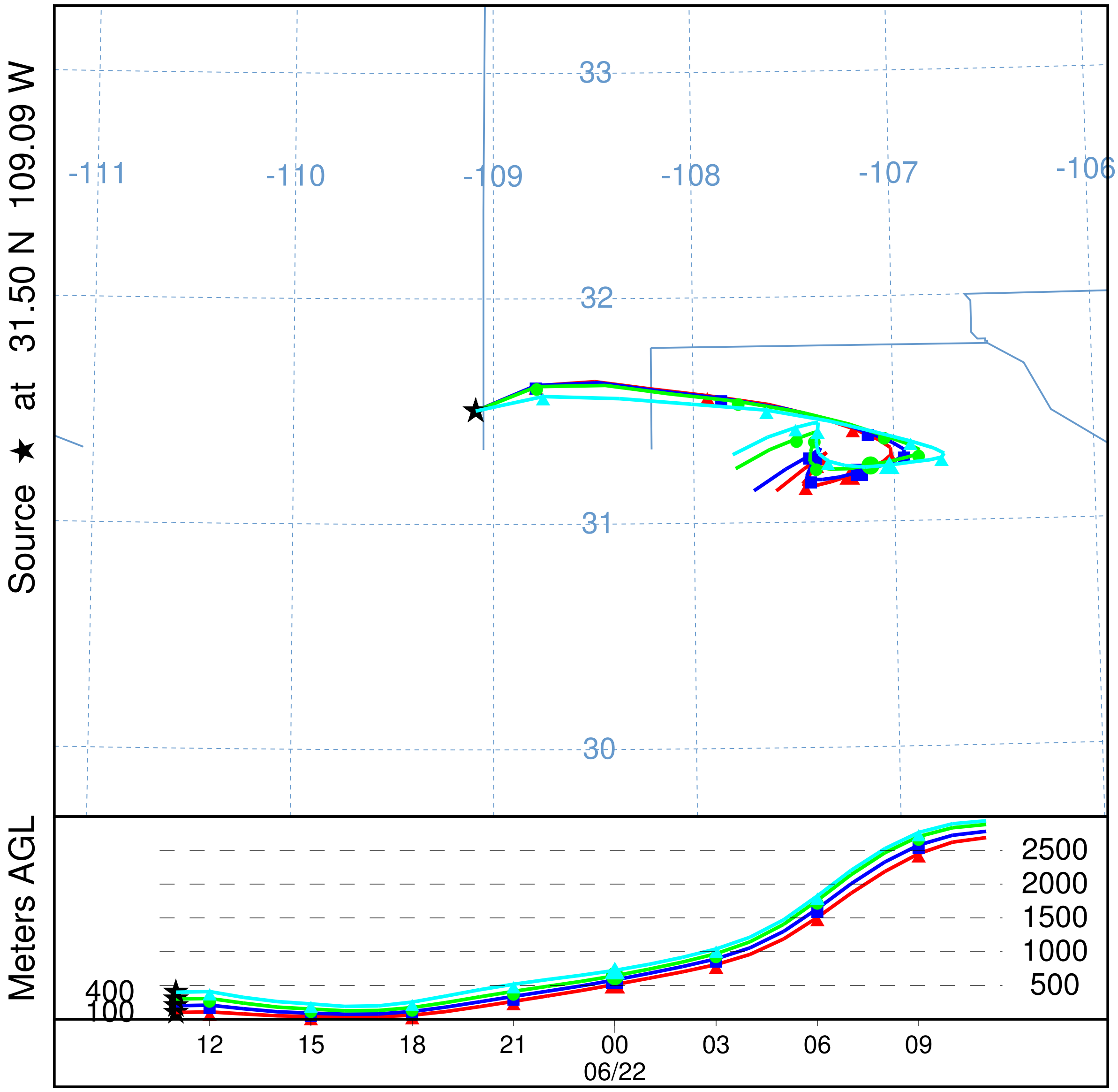
NOAA HYSPLIT MODEL
Forward trajectories starting at 0900 UTC 21 Jun 15
NARR Meteorological Data



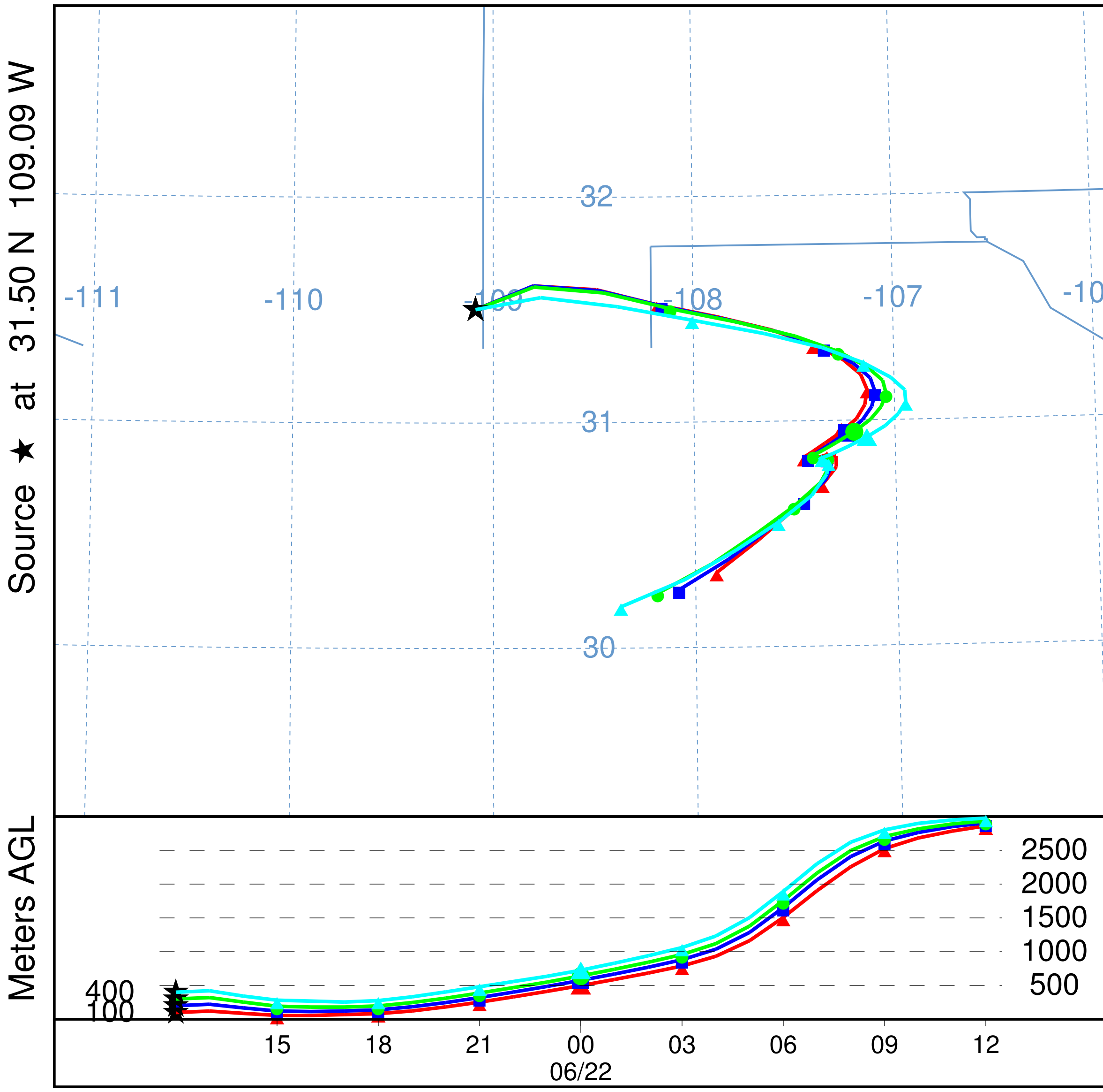


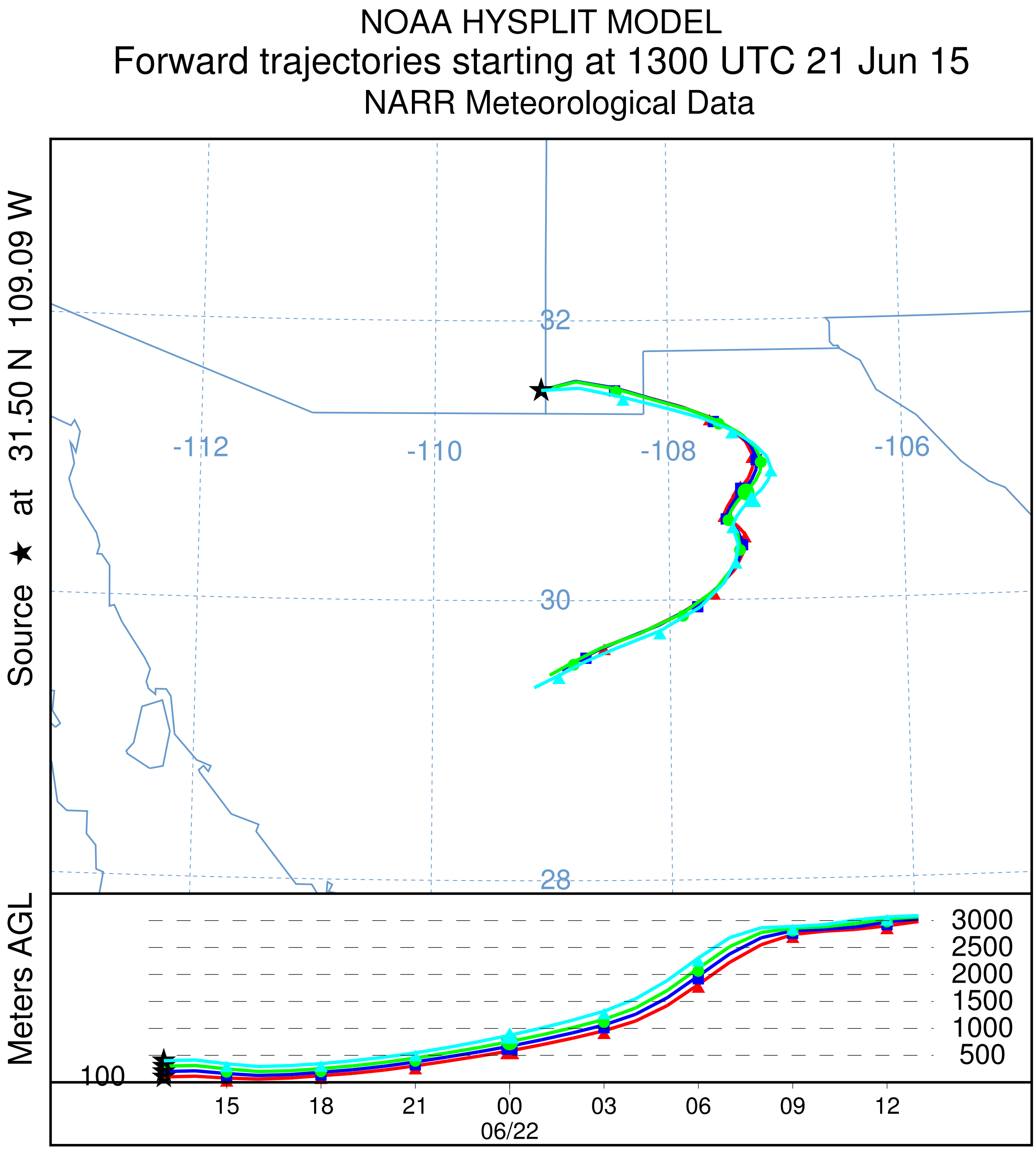
NOAA HYSPLIT MODEL
Forward trajectories starting at 1000 UTC 21 Jun 15
NARR Meteorological Data
Source ★ at 31.50 N 109.09 W
33
32
31
30
-111
-110
-109
-108
-107
-106
Meters AGL
400
100
2500
2000
1500
1000
500
12
15
18
21
00
03
06
09
06/22

NOAA HYSPLIT MODEL
Forward trajectories starting at 1100 UTC 21 Jun 15
NARR Meteorological Data



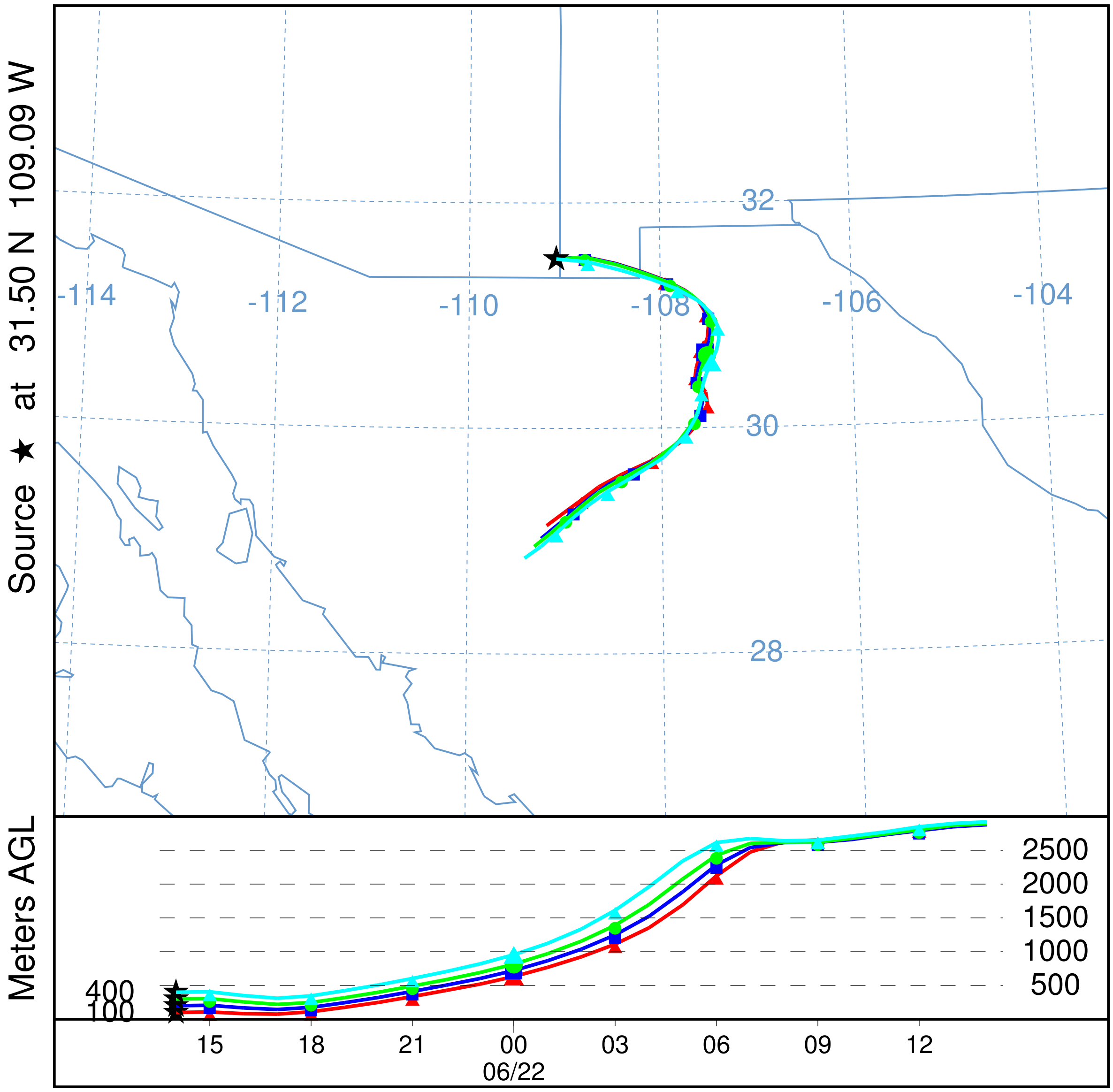
NOAA HYSPLIT MODEL
Forward trajectories starting at 1200 UTC 21 Jun 15
NARR Meteorological Data



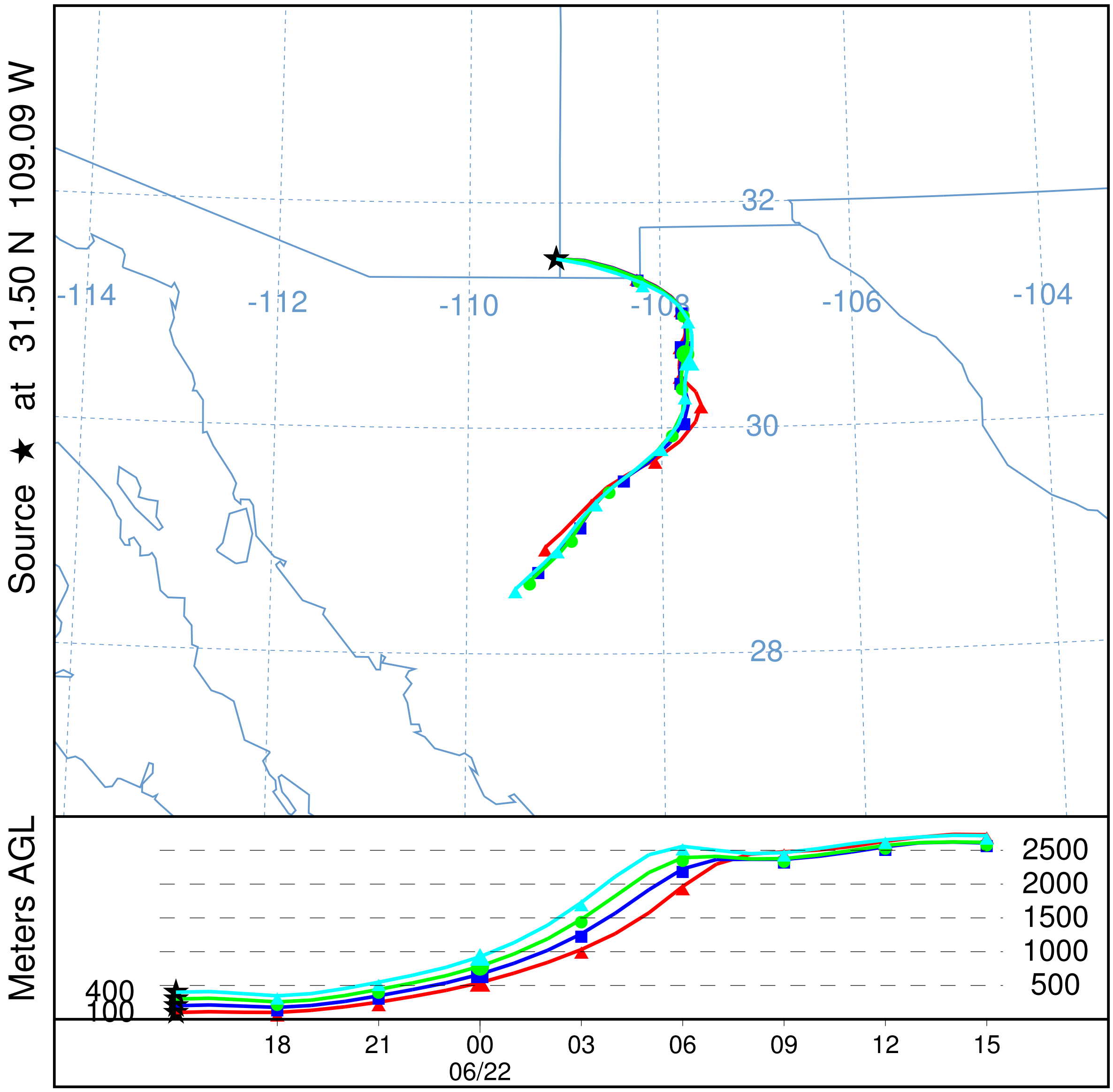


NOAA HYSPLIT MODEL
Forward trajectories starting at 1300 UTC 21 Jun 15
NARR Meteorological Data
Source ★ at 31.50 N 109.09 W
32
30
28
-112
-110
-108
-106
Meters AGL
3000
2500
2000
1500
1000
500
100
15
18
21
00
03
06
09
12
06/22

NOAA HYSPLIT MODEL
Forward trajectories starting at 1400 UTC 21 Jun 15
NARR Meteorological Data



NOAA HYSPLIT MODEL
Forward trajectories starting at 1500 UTC 21 Jun 15
NARR Meteorological Data



APPENDIX D: PUBLIC COMMENTS