

July 6, 2015 Severe Thunderstorms & Flash Flooding

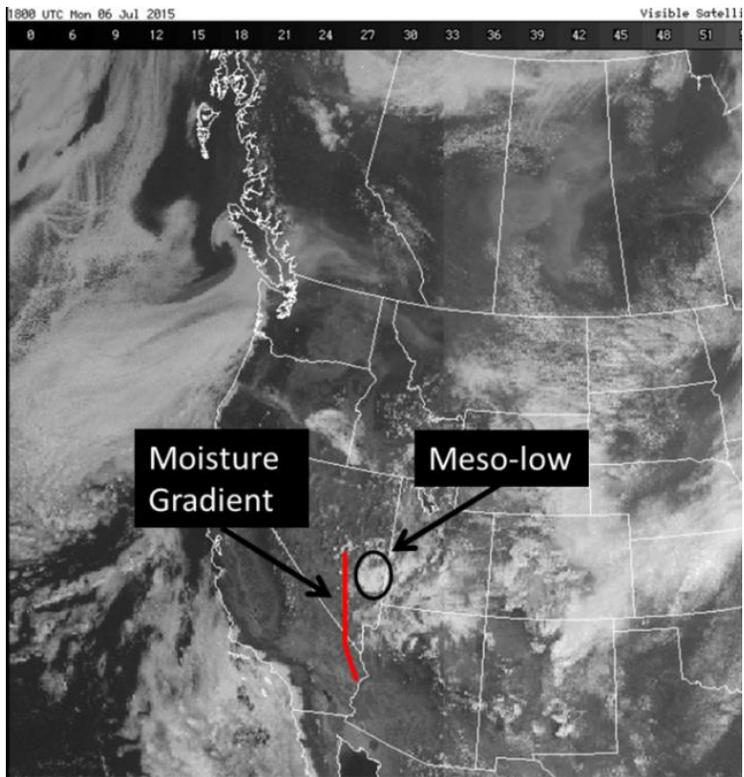
Prepared by Justin Pullin & Chris Outler



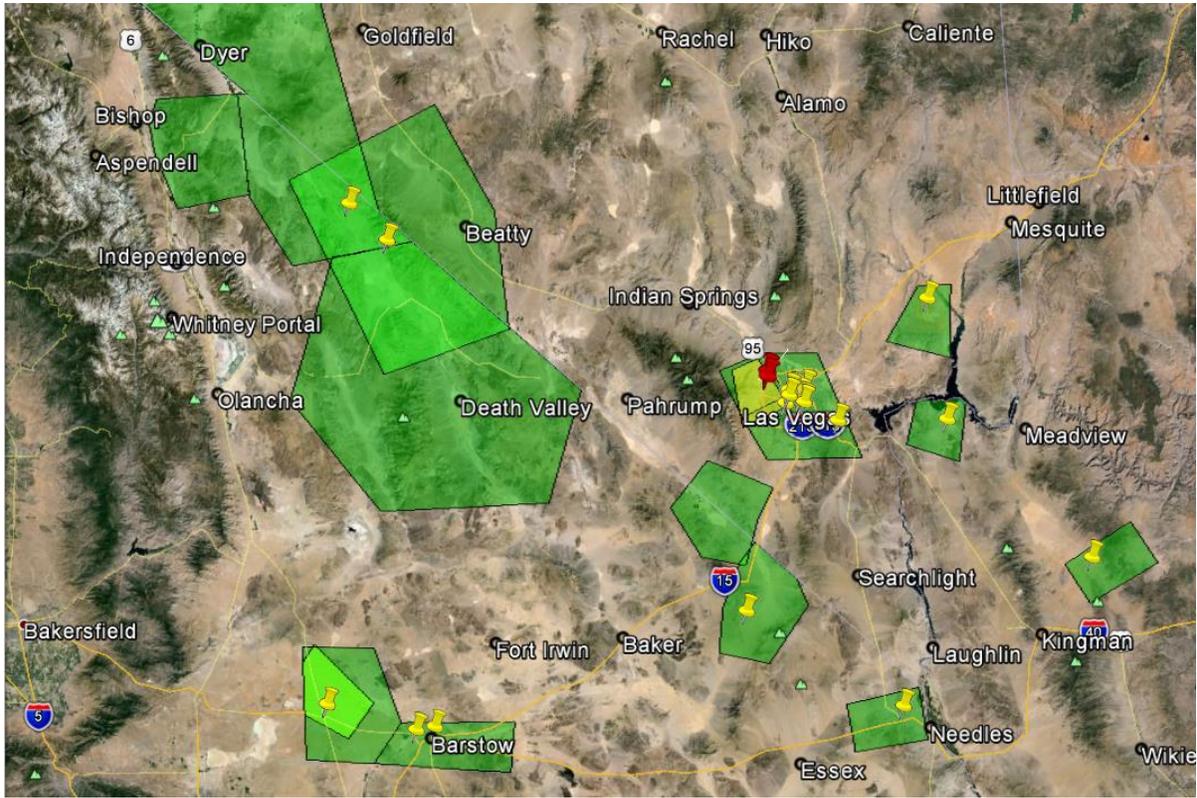
Aerial view of the Las Vegas Severe Storm. Photo courtesy of Dave Hegwald.

Introduction/ Setup

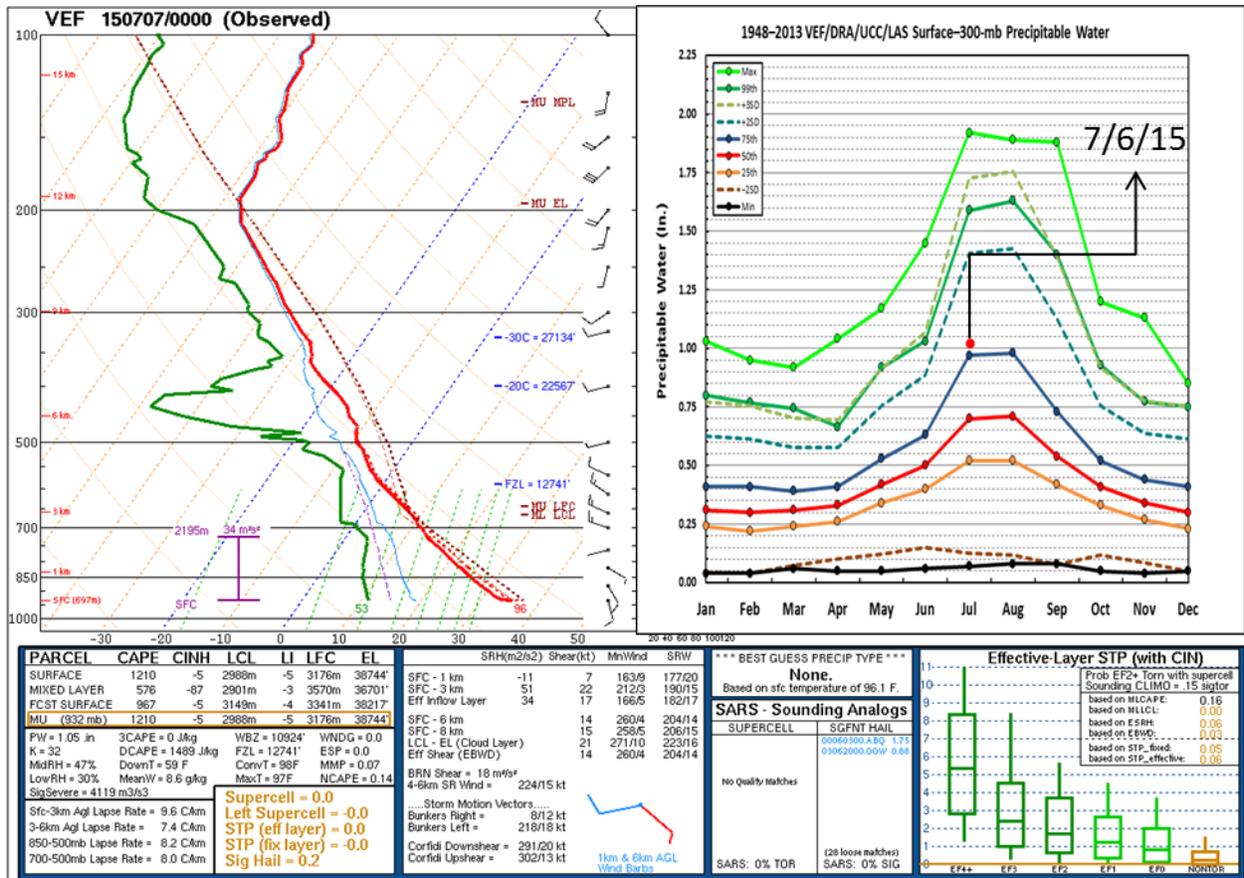
Sufficient moisture coupled with a weak steering flow and several forcing mechanisms set the stage for what was an active flash flooding day across our entire forecast area, including the Las Vegas Valley. As storms from the previous day dissipated during the early morning hours of the 6th, it left a disturbance in its wake centered over southern Lincoln County. This feature, along with a boundary of lingering moisture, was the focal point of thunderstorm development across Lincoln, Clark and Inyo, and San Bernardino Counties. Strong storms erupted across the region during the afternoon hours with numerous reports of flash flooding and hail received by late in the evening.



A disturbance moving northeastward over Lincoln County as well as a lingering dewpoint gradient roughly along the California-Nevada border set the stage for widespread thunderstorm activity.

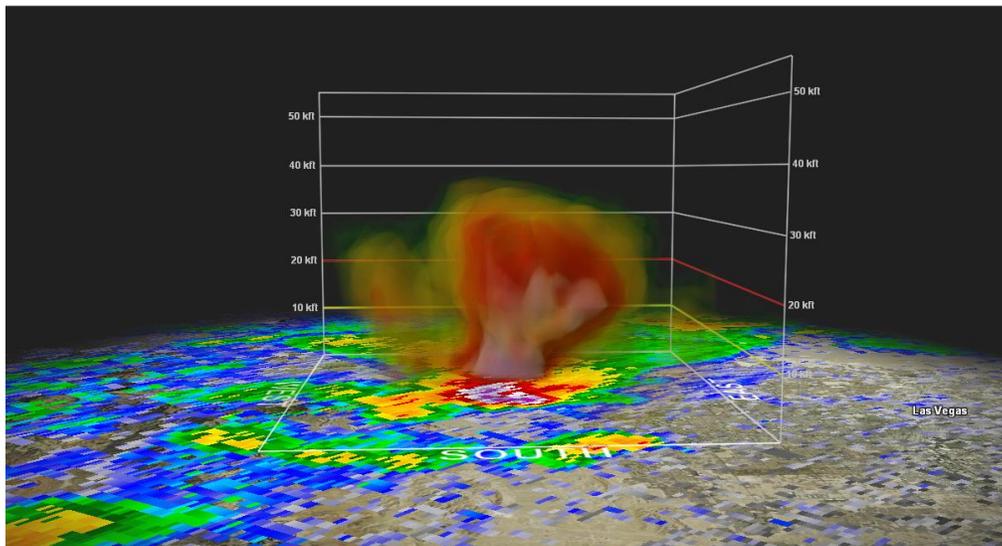


Warnings and reports for this event. The yellow pins denote flash flooding while the red denote hail reports.



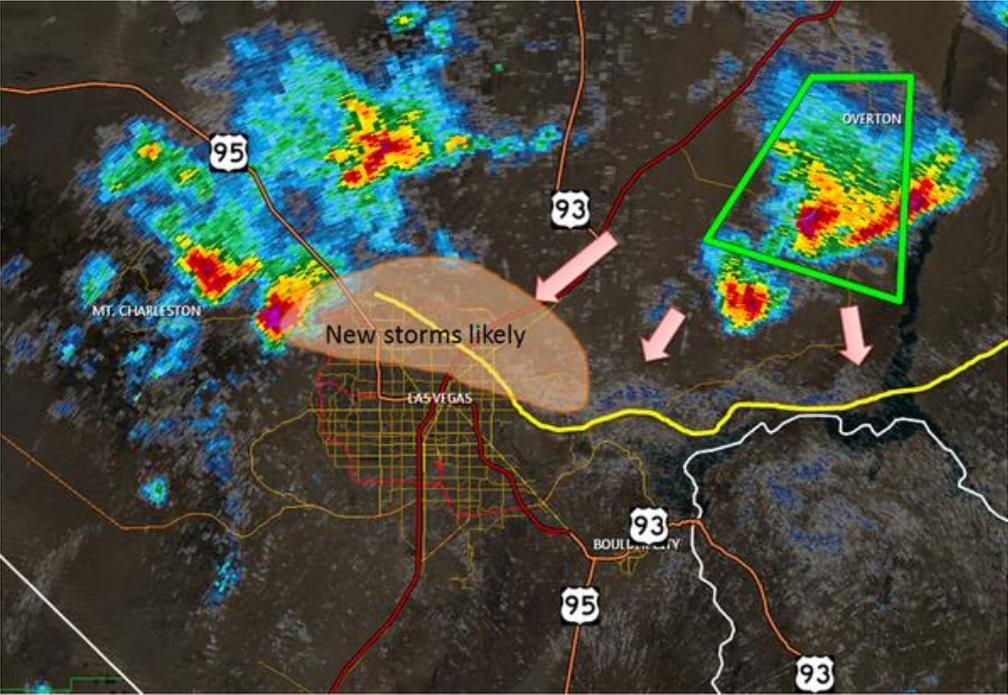
Afternoon Las Vegas sounding, observed roughly one hour before convection swept across the valley. Sufficient moisture (Perceptible water: 1.05 in) and ample instability was available to fuel thunderstorm development across the valley.

A Closer Look: Las Vegas Storms

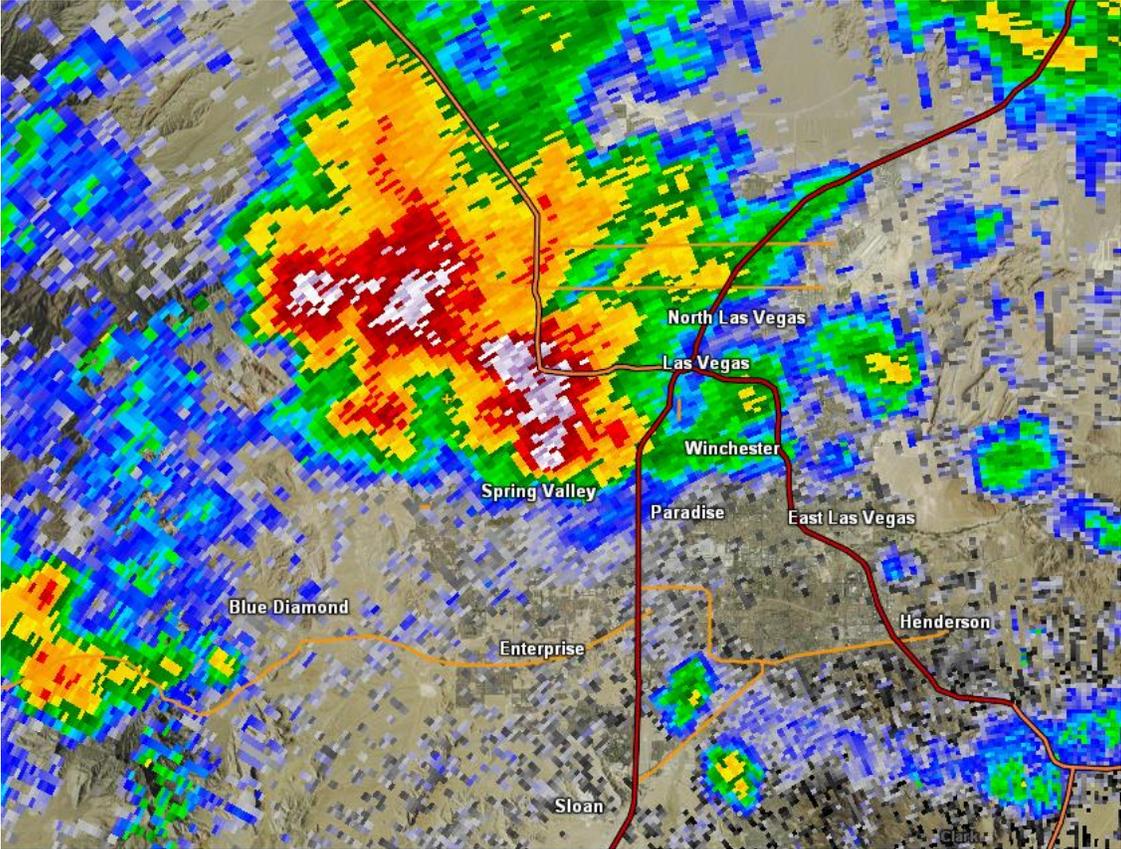


The Las Vegas storms originated along the Spring Mountains and Sheep Range, as outflow from storms in Lincoln County encroached on the area. These storms moved south-southeastward

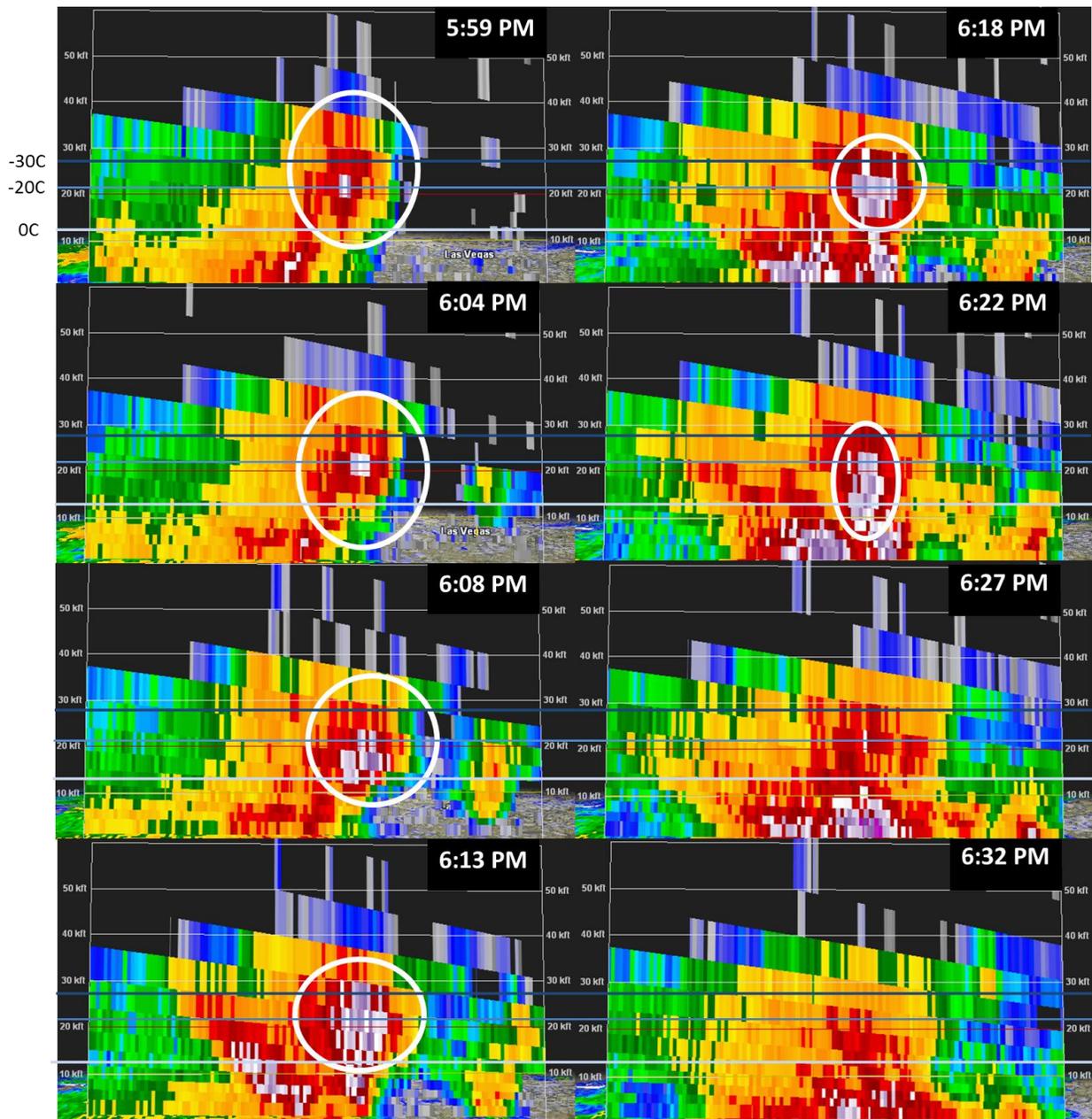
along the outflow boundary through the valley, yielding 0.75 to 1" (penny to quarter sized) hail in the northwest valley and flash flooding in many valley locales.



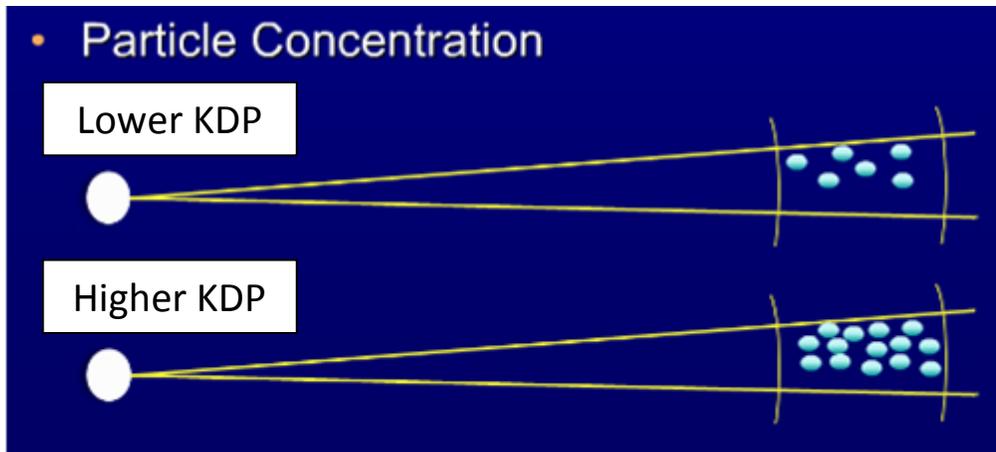
Social media post 30 minutes prior to storms developing in the Las Vegas Valley.



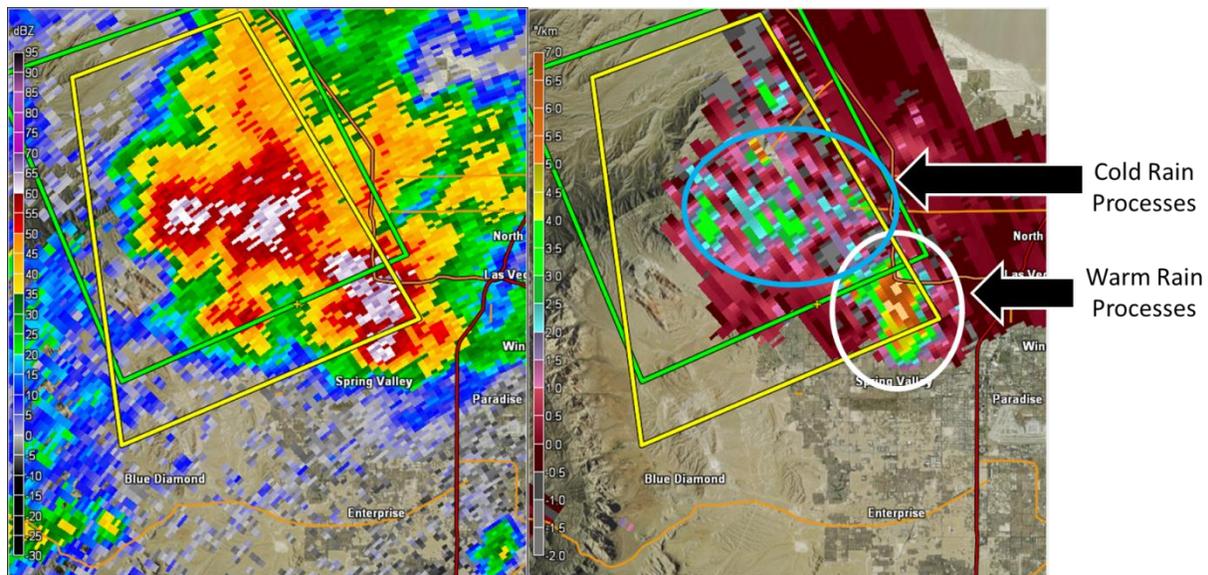
The original storm moved into the northwest valley, with new storms developing to the southeast.



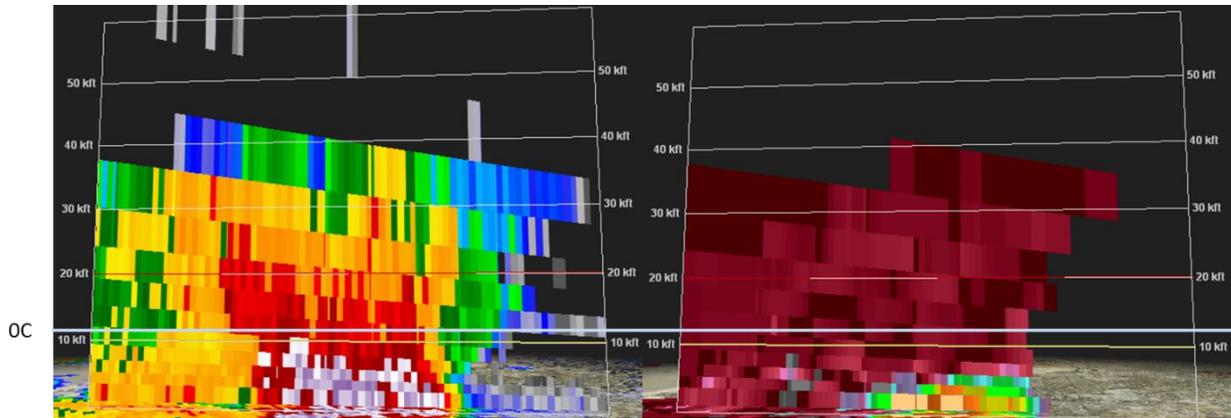
Cross-section analysis shows the storm featuring a tilted updraft, favoring size sorting of internal water droplets and suspended hail (in the white circle). In a span of ~30 minutes, the core aloft intensifies and falls to the surface by 6:32PM, the time of the hail report. Up until 6:27PM, the hail core remained separated from intense rainfall taking place in other portions of the storm (the core to the left of the white circle). This, along with fairly dry humidity levels in the lower levels of the atmosphere and ample instability in the upper levels of the atmosphere made conditions conducive for hail with this storm.



The KDP (Specific Differential Phase) dual-pol radar product is used by forecasters to determine the density of particles (reflectors) within the radar beam. Higher values of KDP indicate a higher density of reflectors in the radar beam. Higher KDP is common when "warm rain" processes take place within a cloud, as raindrops tend to be smaller and more numerous, yielding higher density in the radar beam. "Cold rain" processes typically yield lower KDP values due to the fact that rain drops tend to be larger and less concentrated, yielding lower density in the radar beam. Hail is also considered a cold rain process.

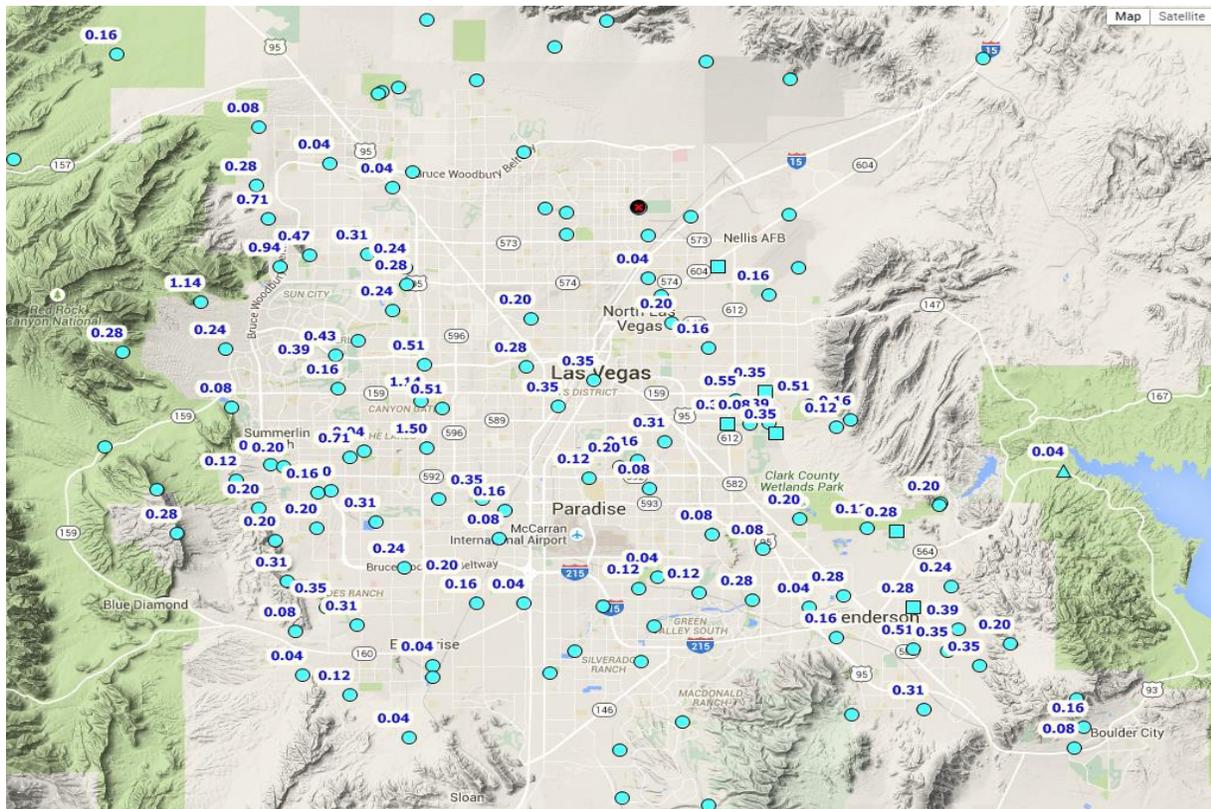


Notice the difference in KDP values between the storm over Summerlin/Spring Valley and the hail producing storm to the northwest. The majority of the flash flooding occurred with the Summerlin/Spring Valley storm, as precipitation processes were purely warm as illustrated by the higher KDP values.



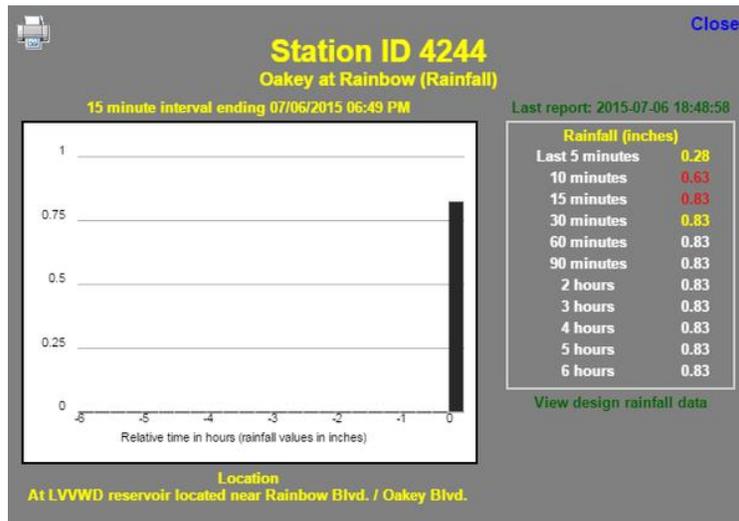
Here is a cross section of the Summerlin/Spring Valley storm that produced flash flooding. The freezing level of the atmosphere is denoted by the white line. Notice the highest reflectivity values are below this level and are juxtaposed with extremely high KDP values. This indicates warm rain processes taking place with this storm and is a reason why such intense rainfall rates were observed.

Impacts

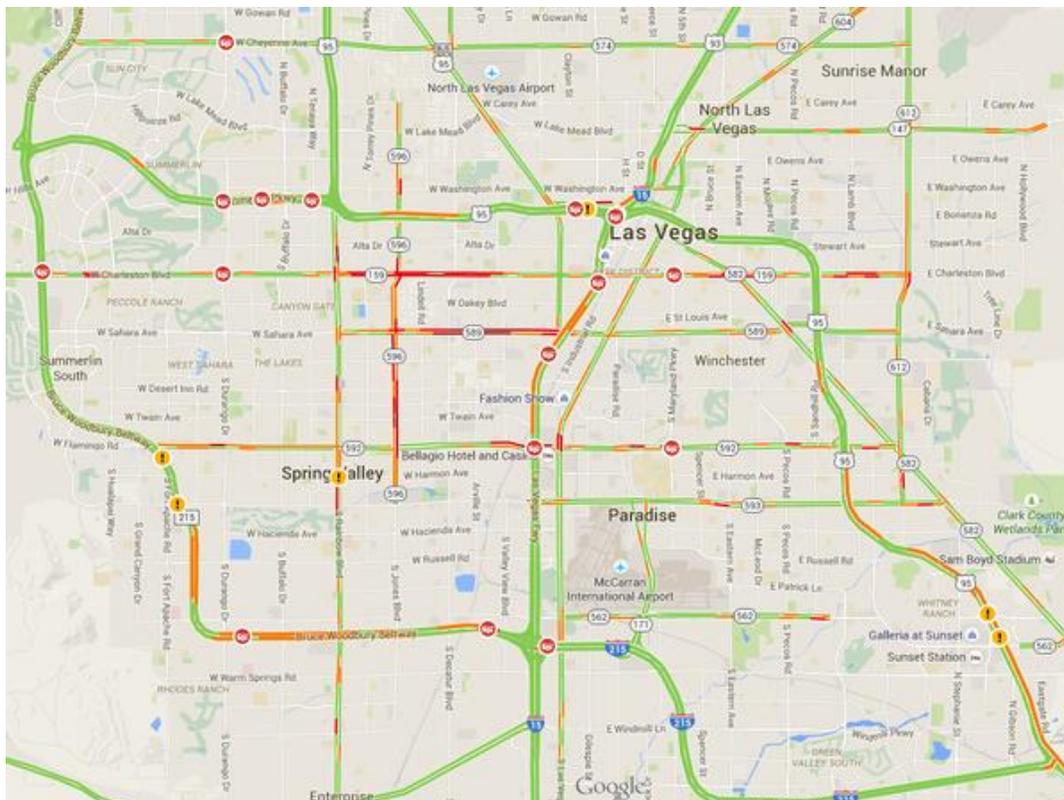


Despite the quick forward motion of the storms along the outflow boundary in the Las Vegas Valley, there were rainfall totals in the western valley that exceeded the 1 inch mark. This was due to the high precipitation efficiency of several storms outlined in the previous section as

well as an easterly component in motion, allowing this area to be effected by several rounds of intense rainfall prior to clearing out. The highest total recorded was 1.5 inches at Rainbow and Desert Inn, with many other locales on the west side ranging from 0.75 to 1 inch totals. The rest of the valley generally ranged from 0.25 to 0.50 inch of rain, as storms with much quicker forward motion and generally less intense rain rates than the original cells moved through these locales.



The gauge at Oakey and Rainbow puts in perspective just how efficient the new cells ahead of the original hail-producing storm were, recording 0.63" of rain in 10 minutes. Those are rates of roughly 3.75"/hr.



Here is a traffic map during the event, highlighting areas of flooding and traffic incidents due to wet roads.

Photos

Big thanks to all of our social media followers, as well as regional weather spotters who submitted the following pictures to us and provided us with valuable weather updates.



The storm approaching the southwest portion of the valley. Photo courtesy of Billy Vegas.



The storm as viewed from the US-95 ramp. Photo courtesy of Darrell Clulow.



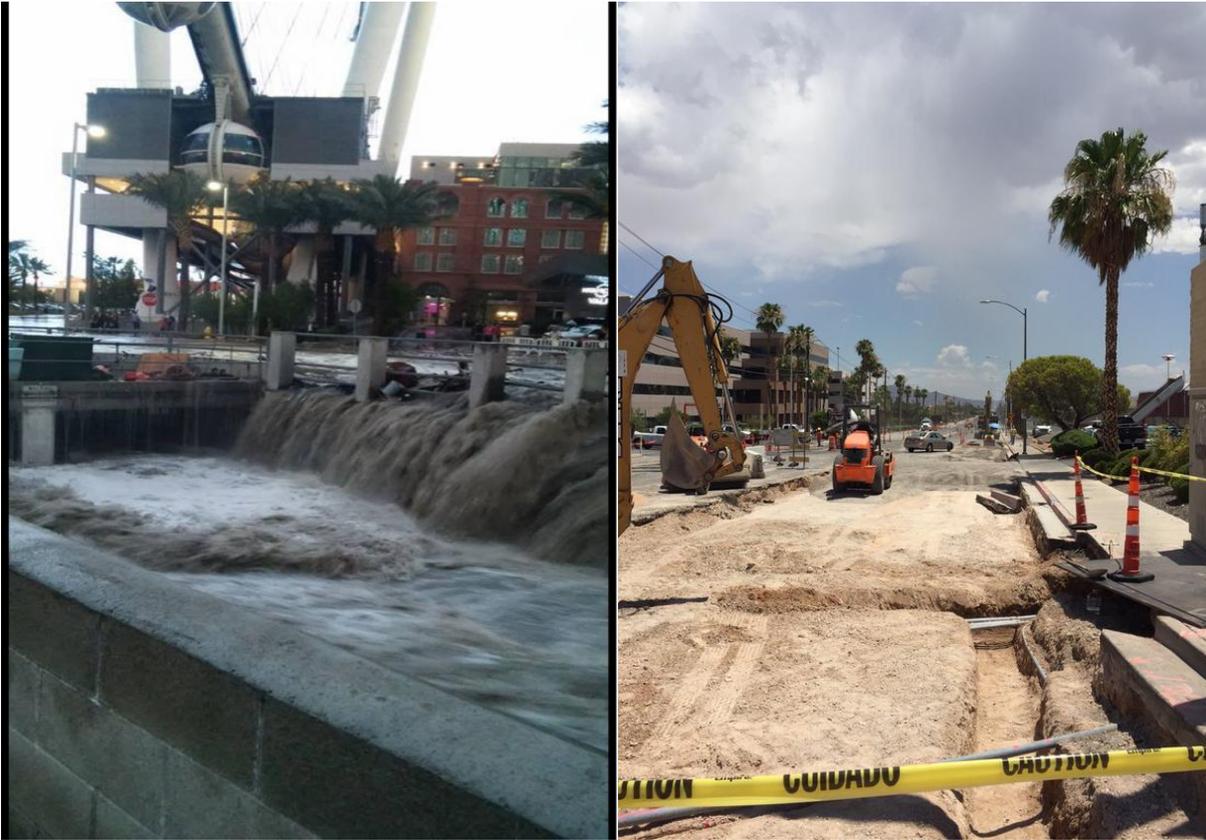
Heavy rain and hail affecting Dolan Springs, AZ. Photo courtesy of Mona Jensen.



Webcam shot from SE Career Tech Academy of the storm over the west valley.



Swift water rescue taking place at Teddy Dr. and S Rancho Dr.



Water flowing through the Linq property into the Flamingo Wash (left). Photo courtesy of Michael Trompeta.
Cleanup and repairs taking place at Decatur and Oakey (right). Photo courtesy of Jeff Gillan.



Debris accumulation in Las Vegas. Photo courtesy of the Clark County Flood Control District.



Cleanup effort taking place in hard hit areas of the Las Vegas valley. Photo courtesy of Sergio Avila, News 3.



Four feet of mud and rocks covers Scotty's Castle Road. Photo courtesy of Death Valley National Park.