Application No.:	A.24-10-002
Exhibit No.:	SCE-13
Witnesses:	C. Lautenberger D. Schulte

(U 338-E)

Woolsey Fire Cost Recovery Application – Rebuttal External Factors Testimony

Before the

Public Utilities Commission of the State of California

Rosemead, California
July 15, 2025

SCE-13: Woolsey Fire Cost Recovery Application - Rebuttal External Factors Testimony

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I.

INTRODUCTION

SCE's opening testimony (SCE-04) described the external factors that caused the Woolsey Fire to grow out of control and become one of the most destructive wildfires in California's recorded history. SCE explained how the fire suppression response was complicated by what was described as "a perfect storm of factors" that strained firefighting resources and hampered suppression efforts. SCE's testimony also described additional external factors, including topography, fire history, wind speeds, and fuel moistures, among others, that impacted the fire's spread and contributed to its destructiveness. Cal Advocates' testimony largely does not respond to or engage with the analysis in SCE-04. To the extent it does, SCE submits this rebuttal testimony.

In CA-02 and CA-03, Cal Advocates discusses utility-associated wildfires in SCE's territory and presents detailed information regarding the fire risk mapping, wildfire history, and Red Flag Warnings specific to the area where the Woolsey Fire ignited. As SCE noted in opening testimony, however, the area is designated as High Fire Threat District (HFTD) Tier 3 and therefore faces extreme fire risk. And nothing in the data or CA-02 or CA-03 demonstrates that the area faced particularly unique or unusual wildfire risk, as compared to other high fire areas across SCE's service area.

In CA-05, Section V.B.2, Cal Advocates suggests that the secondary ignition reduced the effectiveness of the initial fire suppression efforts and slowed the response to the Woolsey Fire. Based on one comment by a Boeing firefighter, Cal Advocates conjectures that the fire might have been effectively contained or slowed had there been only a single ignition at the Subject Pole, rather than the two simultaneous ignitions that occurred and quickly merged. This speculation is unsubstantiated and inconsistent with the available evidence. Cal Advocates does not dispute that because of the significant resource drawdown and the priority given to the Hill Fire which ignited just 20 minutes earlier, the limited fire suppression resources that were available and dedicated to the Woolsey Fire were insufficient to mount a successful initial attack. Indeed, the evidence relied on by Cal Advocates confirms that the demands of the Hill Fire thwarted the response to the Woolsey Fire. That the available resources were insufficient to suppress and contain the fire on initial attack remains true even in a counterfactual scenario involving a single ignition at the Subject Pole. Cal Advocates also does not dispute SCE's showing that had sufficient resources been available, a successful initial attack could have avoided or significantly reduced substantial damages that were incurred south of Highway 101.

However, once early containment was unsuccessful, the fire's ultimate footprint and final outcome was the same whether there was a single ignition or two simultaneous ignitions.

II.

THE AREA WHERE THE WOOLSEY FIRE IGNITED WAS NOT UNIQUE OR UNUSUAL FOR HIGH FIRE AREAS

In CA-02 and CA-03, Cal Advocates presents testimony describing the history of utility-associated wildfires in SCE's service area, as well as detailed information regarding the fire risk mapping, wildfire history, and Red Flag Warnings specific to the area where the Woolsey Fire ignited. It appears that the purpose of Cal Advocates' testimony in this regard is to suggest that these "risk factors" made the area where the Woolsey Fire ignited particularly susceptible to wildfires.

However, as SCE noted in opening testimony, this area is classified as High Fire Threat District (HFTD) Tier 3 under the Commission's final Fire Threat Map (extreme wildland fire risk). Prior to 2018, the area was previously designated as either Very High or unclassified under the Commission's interim Fire Resource and Assessment Program (FRAP) Map. Even prior to adoption of the final map, SCE was appropriately treating the whole area as High Fire Risk Area (HFRA) and was implementing SOB 322 protocols during Red Flag Warning events.

Moreover, these designations are not particularly unusual as approximately 36 percent of California's land is in HFTD Tier 2 and approximately 8 percent is in HFTD Tier 3.[1] Around the time of the Woolsey Fire, SCE classified approximately 35 percent of its 50,000 square mile service area as HFRA, including approximately 4,700 square miles (9 percent) in HFTD Tier 3 and approximately 9,600 square miles (18 percent) in HFTD Tier 2.[2] In addition, about 8,000 circuit miles (16 percent) and about 6,000 circuit miles (12 percent) of SCE's approximately 51,600 total primary overhead circuit miles were in HFTD Tier 3 and HFTD Tier 2, respectively.

Nothing in CA-02 or CA-03 demonstrates that the area surrounding where the Woolsey Fire ignited faced unique or unusual wildfire risk as compared to other high fire areas across SCE's service area. Indeed, the data show that the frequency and intensity of fire in this area were not outliers. For instance, in CA-03, Cal Advocates presents data from the FRAP database showing that "areas near the

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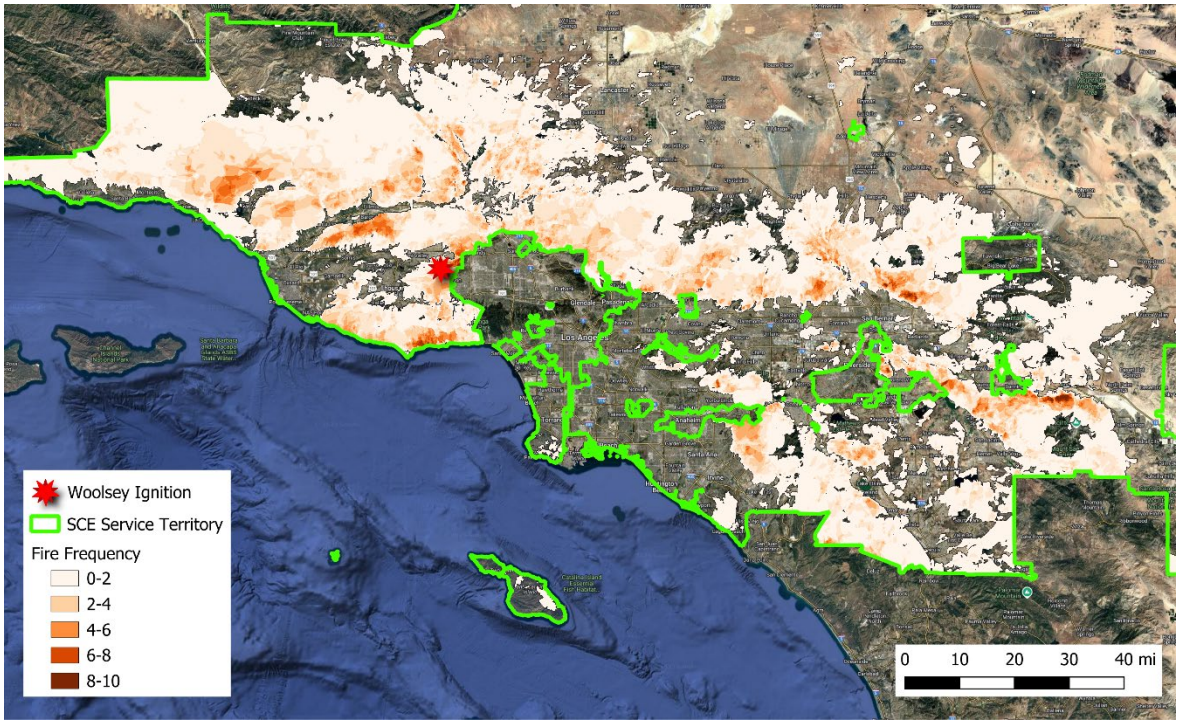
[1] California Public Utilities Commission, Fire-Threat Maps and Fire-Safety Rulemaking, *available at* https://www.cpuc.ca.gov/industries-and-topics/wildfires/fire-threat-maps-and-fire-safety-rulemaking.

[2] Southern California Edison, Wildfire Mitigation Plan (2019), p. 29, *available at* https://energysafety.ca.gov/wp-content/uploads/docs/misc/docket/263645320.pdf.

Big Rock circuit had historically endured multiple wildfires" and that "the area northeast of the Woolsey Fire ignition sites had experienced common wildfire occurrences in the historical dataset since 1878."[3]

However, Figure II-1 below depicts a larger map of fire frequency within the southern part of SCE's service territory from 1898 to October 31, 2018, also based on the FRAP database.[4] The figure shows that the frequency of fire in the Woolsey vicinity was not unique, as several other areas exist within the southern part of SCE's service territory that have previously experienced multiple fires in the past 120+ years.

Figure II-1
Fire Frequency in Southern California



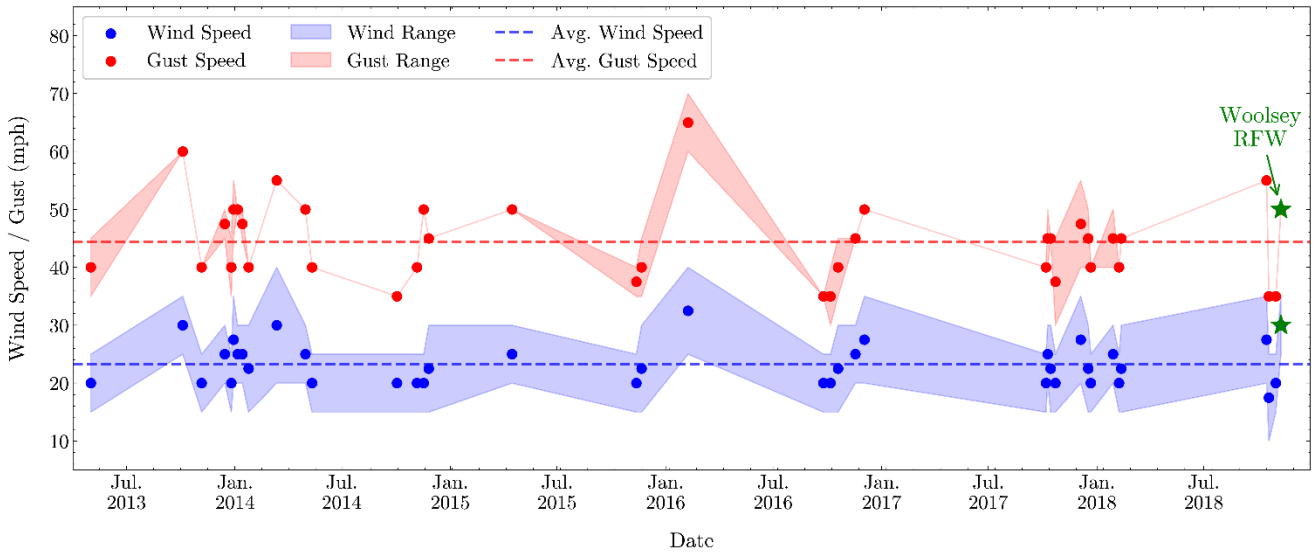
Likewise, analysis of National Weather Service (NWS) zone CAZ245, which includes the Woolsey ignition area, shows that this zone did not exhibit unusually risky fire characteristics. In CA-03, Cal Advocates presents information on Red Flag Warnings (RFW) issued by NWS for CAZ245

[3] CA-03, p. 12. The reference to "1878" may be an inadvertent typo; Cal Advocates likely intended "1898."

[4] Although the FRAP database includes fires dating back to 1898, fire perimeters prior to the 1970s are not very reliable because they predated modern GIS mapping technology.

between 2013 and October 2018.[5] Figure II-2 below shows the expected wind speed and gust speed, together with their range, as forecasted by NWS for each of the RFW identified by Cal Advocates, along with the Woolsey event in November 2018.[6] The data show that although the winds forecasted for the Woolsey RFW were strong, they were not the worst conditions forecasted in this zone and were within the range of previous RFW. Notably, more extreme RFW conditions forecasted in the same zone did not result in catastrophic fire, and the Santa Ana wind event on November 8-9, 2018, was not particularly strong relative to other Santa Ana winds that have occurred prior to and since the Woolsey Fire.

Figure II-2
RFW in Zone CAZ245 between 2013-2018



In addition, Figure II-3 and Figure II-4 depict the number and total duration of RFW in NWS zones within SCE's service territory from 2013 to October 2018.[7] The data show that NWS zone CAZ245 was not an outlier, and that several other NWS zones within SCE's service territory experienced a higher frequency and longer duration of RFW events during the same time period.

[5] CA-03, pp. 13-18.

[6] Iowa State University, Iowa Environmental Mesonet, https://mesonet.agron.iastate.edu/vtec/search.php.

[7] Zones that experienced less than 10 hours of Red Flag Warning were not shown.

Figure II-3
Number of RFW in NWS zones within SCE's Territory from 2013 to October 2018

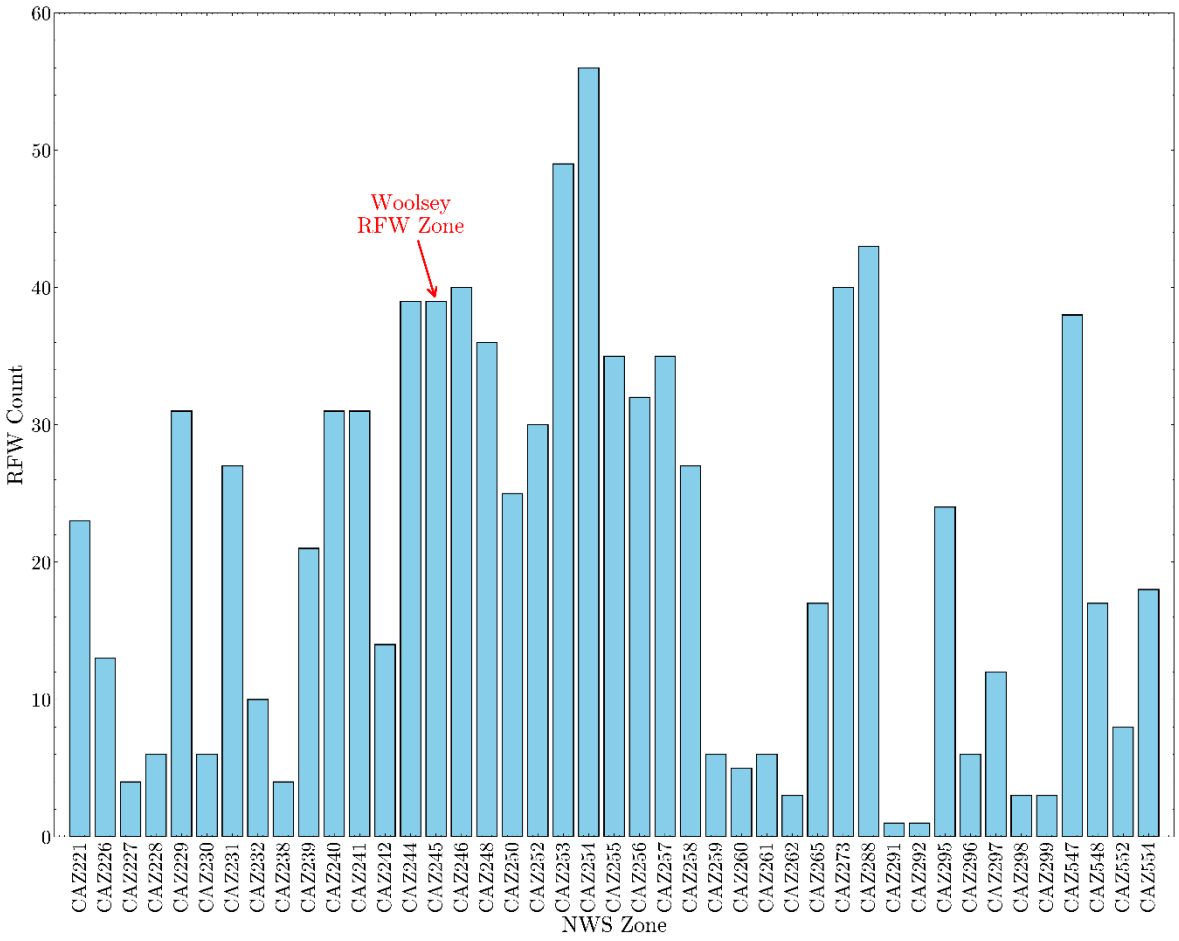
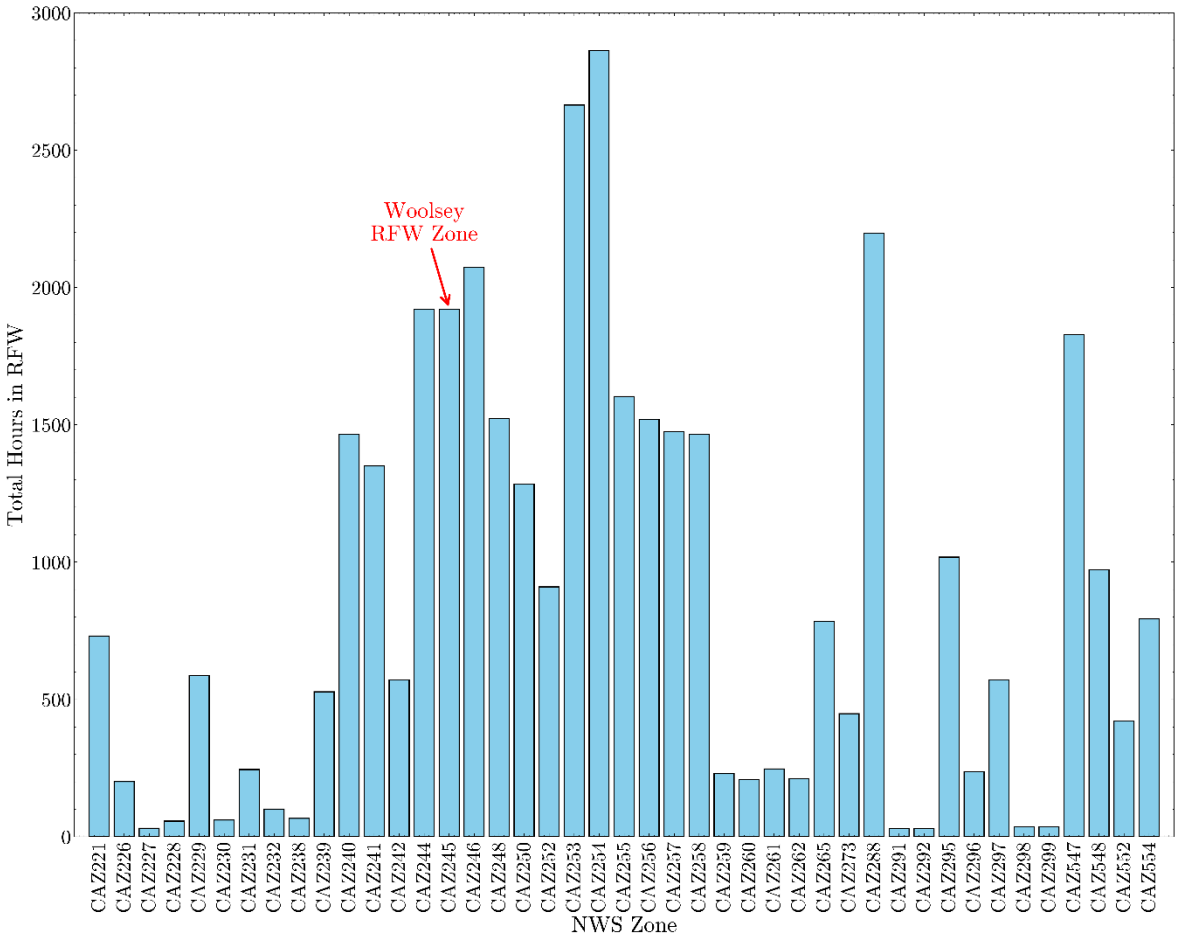


Figure II-4
Total Duration of RFW in NWS zones within SCE's Territory from 2013 to October 2018

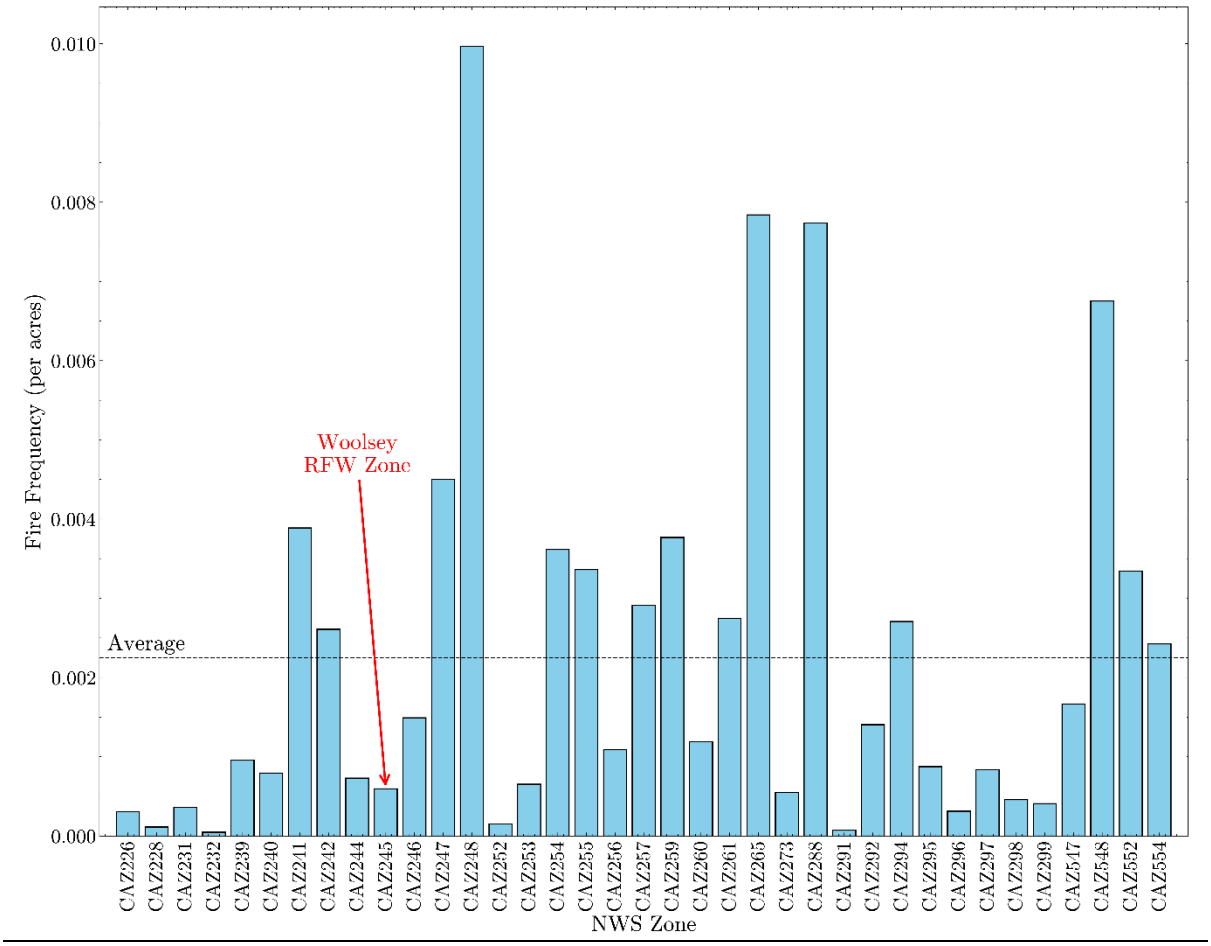


Furthermore, despite the RFW conditions, the area around the Woolsey Fire has seen lower fire activity compared to other zones. Using the Fire Occurrence Database, Figure II-5 and Figure II-6 below depict the frequency and total burned area of historical fires, normalized by the area of each zone, that occurred between 1992 and October 2018 in the NWS Red Flag Warning zones that intersect with SCE's service territory.[8] NWS zone CAZ245, in which the Woolsey Fire ignited, has experienced a

[8] Karen Short, U.S. Dept. of Agriculture, Spatial Wildfire Occurrence Data for The United States, 1992-2020 [FPA_FOD_20221014] (6th ed. 2022), https://www.fs.usda.gov/rds/archive/catalog/RDS-2013-0009.6. Zones with less than 100 fires are not shown.

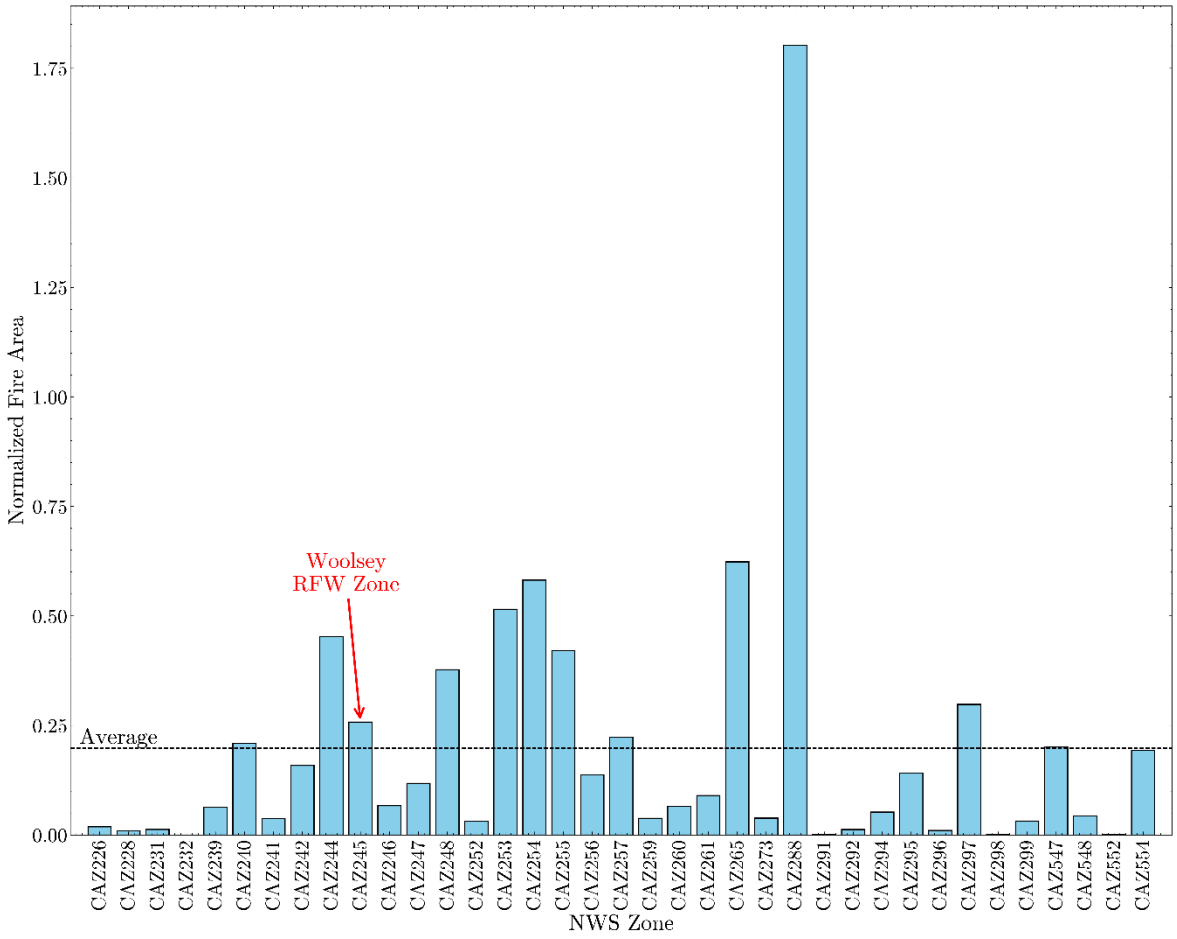
lower number of fires and smaller burned area in comparison to other NWS Zones within SCE's service territory.[9]

Figure II-5
Normalized Fire Frequency in NWS zones within SCE's Territory from 1992 to October 2018



[9] A map showing the location of NWS zone CAZ245 within SCE's service territory is provided in Appendix A, Figure A-1. Notably, the total number of fires and total burned area that occurred in CAZ245 is even *lower* compared to other NWS zones – both well below average – when shown in absolute terms (i.e., not normalized by area). *See* Appendix A, Figure A-2 and Figure A-3.

Figure II-6
Normalized Fire Burned Area in NWS zones within SCE's Territory from 1992 to October 2018



In sum, these characteristics do not suggest that the area where the Woolsey Fire ignited presented particularly heightened fire risk, recognizing its Tier 3 designation. Cal Advocates has not demonstrated that the area was more vulnerable to catastrophic wildfire risk than other high fire areas across SCE's service territory. There also is nothing in the objective data to suggest that the area merited differential treatment with respect to SCE's wildfire mitigation measures, such as by upending SCE's calibrated, risk-informed approach under its Grid Safety and Resiliency Program. If anything, Cal Advocates' testimony merely confirms the area's Tier 3 designation and the foresight of SCE's earlier decision to appropriately treat the area as HFRA.

III.

FIRE SUPPRESSION RESOURCE CONSTRAINTS ARE WHAT DROVE THE PROGRESSION OF AND DAMAGE FROM THE WOOLSEY FIRE, NOT THAT THERE WERE TWO SIMULTANEOUS IGNITIONS WHICH QUICKLY MERGED

In CA-05, Cal Advocates suggests that the secondary ignition reduced the effectiveness of the initial fire suppression efforts and slowed the response to the Woolsey Fire.[10] Cal Advocates points to a comment made to fire agency investigators by a Boeing firefighter, who described the initial ignition at the Subject Pole as "lazy" and directed his single engine to attack the secondary ignition first.[11] Based on this one comment, Cal Advocates hypothesizes that "had there only been a single ignition at the Subject Pole (Site #2), the Boeing facility's fire engine would have been able to effectively contain the fire or slow its spread until fire agencies arrived on the scene."[12] Cal Advocates' speculation is unsubstantiated and inconsistent with the available evidence. Due to the significant resource drawdown and the priority given to the Hill Fire, which ignited just 20 minutes earlier, the limited fire suppression resources that were available and dedicated to the Woolsey Fire were insufficient to mount a successful initial attack and contain the fire. That fact is no less true even in a counterfactual scenario involving a single ignition at the Subject Pole, as opposed to the two simultaneous ignitions that occurred in close proximity to one another and quickly merged.

A. Cal Advocates Does Not Dispute that the Initial Fire Suppression Response to the Woolsey Fire Was Severely Constrained Due to Resource Drawdown and the Hill Fire

The deciding factor on the day of the Woolsey Fire was the fundamental lack of firefighting resources, particularly aerial support, during the initial response throughout the afternoon and evening hours on November 8, 2018, not the fact of one or two ignitions in the first few minutes. The record is clear that the response to the Woolsey Fire was severely constrained due to the drawdown on state resources from the Camp Fire in Northern California,[13] as well as the decision to prioritize the nearby

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[10] CA-05, pp. 19-20.

[11] Woolsey Fire Agency Report, p. 44 and attachment 23, file "181109_1150_R.mp3" at approximate timestamp 6:40-6:55.

[12] CA-05, p. 20.

[13] *See* SCE-04, pp. 5, 7, 11, 19. Although Cal OES Region 1, including Los Angeles and Ventura Counties, did not send resources directly to the Camp Fire, over 1,000 fire personnel were assigned to the Camp Fire, which impacted the statewide pool of available firefighting resources to respond to the Woolsey Fire. The Camp Fire had been actively burning structures in the town of Paradise for more than six hours by the time the Hill and (*Continued*)

Hill Fire, which ignited just 20 minutes earlier.[14] Indeed, in the very audio recording that Cal Advocates relies on in its testimony, the Ventura County Fire Department (VCFD) investigators specifically state that the Hill Fire was ***the reason*** "***why we didn't even have anybody up here***" to respond to the Woolsey Fire.[15] The VCFD investigators noted the close proximity in time between the two fires—Hill was reported at 2:03 p.m. and Woolsey was reported at 2:24 p.m.—and the heightened concern that the Hill Fire could jump Highway 101, both of which resulted in the tactical decision to prioritize the response to the Hill Fire.[16]

Fire agency reports, media investigations, and witness interviews detail how the Hill Fire received hundreds of fire engines and multiple air tankers on initial dispatch.[17] The Boeing firefighter confirmed this resource drawdown, stating, "I heard the Hill Fire and ***heard the world going that way***."[18] In contrast, the Woolsey Fire was first dispatched as a "smoke check," which consisted of just one battalion chief and two engines from VCFD, and was later upgraded to a full brush response.[19] However, due to commitments at the Hill Fire, VCFD was not able to furnish a full response even though under the Santa Susana mutual aid agreement, the minimum planned brush response from VCFD should have been at least 5 engines, 2 battalion chiefs, 1 water tender, 1 bulldozer, 2 Cal Fire crews, and 3 helicopters.[20]

Woolsey Fires ignited in Southern California. *See* Citygate Associates, LLC, County of Los Angeles After Action Review of the Woolsey Fire Incident, Nov. 17, 2019 (LA County After Action Review), pp. 2, 20, 55; *see also* Ventura County Sheriff Office of Emergency Services, County of Ventura, The Hill & Woolsey Fires Emergency Response After-Action Review, January 2020 (Ventura County After Action Review), pp. 9, 11. The LA County After Action Review and Ventura County After Action Review were attached to SCE-04 as Appendix A and Appendix B, respectively.

[14] SCE-04, pp. 5-7.

[15] Woolsey Fire Agency Report, attachment 23, file "181109_1150_R.mp3" at approximate timestamp 8:00:8:08 (emphasis added).

[16] Woolsey Fire Agency Report, attachment 23, file "181109_1150_R.mp3" at approximate timestamp 8:00:8:27.

[17] SCE-04, p. 9.

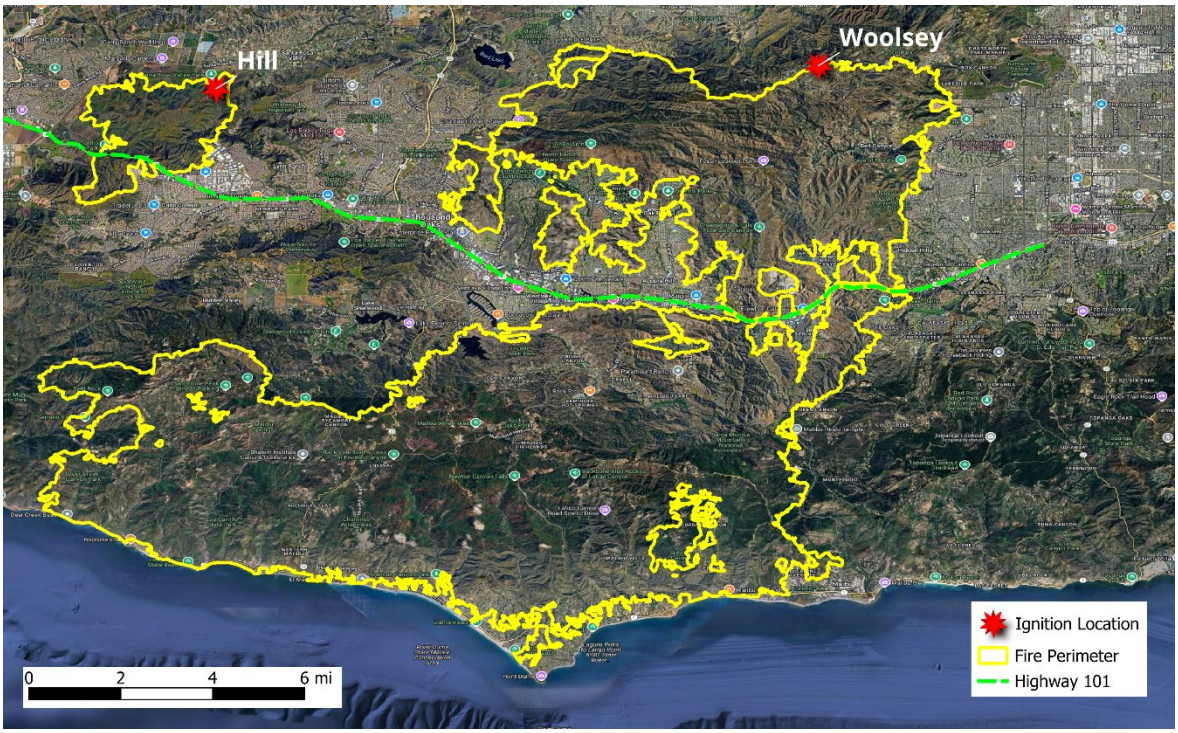
[18] Woolsey Fire Agency Report, attachment 23, file "181109_1150_R.mp3" at approximate timestamp 8:12:8:20 (emphasis added).

[19] SCE-04, pp. 8-9.

[20] SCE-04, pp. 8-9 and Appendix C, Memorandum of Understanding, Exchange of Emergency Services Between the Consolidated Fire Protection District of Los Angeles County and the Ventura County Fire Protection District, Exhibit C, Annual Operating Plan ("Susana"), July 1, 2017.

Because the Hill Fire ignited earlier and was perceived to pose a more significant threat in the early hours of the fires' progression, it was allocated more firefighting resources than the Woolsey Fire. This significant dispatch of resources was successful in containing the Hill Fire to less than 5,000 acres and just six structures damaged or destroyed.[21] Though the Hill Fire did ultimately cross Highway 101, firefighters were able to stop its forward progress and contain the fire to a relatively limited area south of Highway 101. In contrast, after jumping Highway 101 around 5:15 a.m. on November 9, 2018, the Woolsey Fire ultimately burned nearly 97,000 acres and destroyed or damaged more than 2,000 structures.[22]

Figure III-7
Final Footprint of Hill Fire versus Woolsey Fire



As a consequence of the decision to prioritize the Hill Fire, the limited fire suppression resources that were available from Boeing and the county fire agencies for the Woolsey Fire were insufficient to mount a successful initial attack or effectively contain the fire within the Santa Susana site. Agency

[21] Ventura County After Action Review, p. 3.

[22] LA County After Action Review, p. 4.

records and news reports also show that by the time some resources were finally shifted from the Hill Fire to the Woolsey Fire, it was already too late. The lack of sufficient resources during the first several hours, particularly fixed wing aircraft and helicopters, was a significant factor contributing to the fire growth.[23] It was not until late in the afternoon on November 8 that air tankers were finally diverted to the Woolsey Fire from the Hill Fire. These air tankers were only able to drop two loads of fire retardant on the Woolsey Fire before hitting the visible flight limits and being grounded for the evening.[24] This meant that Woolsey received very limited air support during the critical daylight hours immediately following ignition and before the winds picked up, while fire suppression aircraft were able to fly.[25] Further limiting the response, strike teams from Los Angeles County that had assembled as early as 4:33 p.m. may have been held back across county lines in Agoura Hills until after 9 p.m.[26] The Hill Fire Incident Command Team was also slow to release excess resources to Woolsey until around 11 p.m. or midnight on the evening of November 8.[27] As a result, after the winds picked up around sundown and all but a few night vision-capable helicopters from LA County Fire and LA City Fire were grounded,[28] data from the GOES-16 satellite shows that relative fire activity on the Woolsey Fire began outpacing the Hill Fire.[29] Once the fire jumped Highway 101 early on the morning of November 9, 2018, it quickly burned all the way to the Malibu coast.[30]

Cal Advocates does not dispute any of SCE's previous showing in this regard. Yet this evidence conclusively demonstrates that resource constraints and drawdown from the Hill Fire are what limited the effectiveness of the fire suppression response to the Woolsey Fire, not the fact that initially there were two nearby ignitions that quickly merged.

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[23] SCE-04, p. 15.

[24] SCE-04, p. 15 (citing LA County After Action Review, pp. 24-25, 58).

[25] SCE-04, p. 15.

[26] SCE-04, pp. 9-10 (citing Jaclyn Cosgrove, *Must Reads: Firefighters' fateful choices: How the Woolsey fire became an unstoppable monster*, L.A. Times (Jan. 6, 2019), https://www.latimes.com/local/lanow/la-me-woolsey-resources-20190106-htmlstory.html.

[27] SCE-04, p. 15.

[28] SCE-04, p. 16 (citing LA County After Action Review, pp. 26, 58). Notably, Cal Fire did not begin using night operations-capable aircraft until 2020 or 2021. *See* https://www.cbsnews.com/sanfrancisco/news/cal-fire-sikorsky-helicopters-nighttime-operations.

[29] SCE-04, pp. 16-17.

[30] SCE-04, p. 25 (citing LA County After Action Review, pp. 26-30).

B. Infrastructure Decisions Related to Decommissioning of the Santa Susana Field Laboratory Further Exacerbated Resource Constraints

The single Boeing fire truck and limited county firefighters that first responded to the Woolsey Fire encountered significant challenges at the remote site, and their effectiveness was further undermined by ill-timed infrastructure decisions related to decommissioning of the Santa Susana Field Laboratory in the years immediately preceding the Woolsey Fire. These constraints provide further evidence that what made the difference in firefighters' ability to mount a successful initial attack and contain the fire was the lack of available resources, not the fact that the Woolsey Fire started as two nearby ignitions that quickly merged.

The Santa Susana Field Laboratory is located in a remote and difficult to access location. Thus, historically the area had extensive fire suppression infrastructure on site. For instance, the *Los Angeles Times* reported that Boeing used to have a "robust, well-trained firefighting team and about six firefighting apparatus, including two brush rigs, along with at least one ambulance" for the Santa Susana Field Laboratory.[31] The dedicated firefighting department had been housed at a 6,634-square-foot fire station, located very close (approximately 1000 yards) to where the Woolsey Fire ignited.[32] However, between 2015 and 2016, the fire station was demolished and torn down, leaving only a single, older model fire truck stationed near the entrance to the Santa Susana Field Laboratory and further away from where the Woolsey Fire ignited.[33]

Moreover, as part of the cleanup and decommissioning of the site, NASA had removed numerous fire hydrants and sprinklers beginning around 2014.[34] Previously one of the hydrants had been

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[31] Jaclyn Cosgrove, *Southern California Edison and Boeing sued over devastating Woolsey fire*, L.A. Times (Feb. 5, 2019), https://www.latimes.com/local/lanow/la-me-ln-woolsey-fire-boeing-lawsuit-20190205-story.html

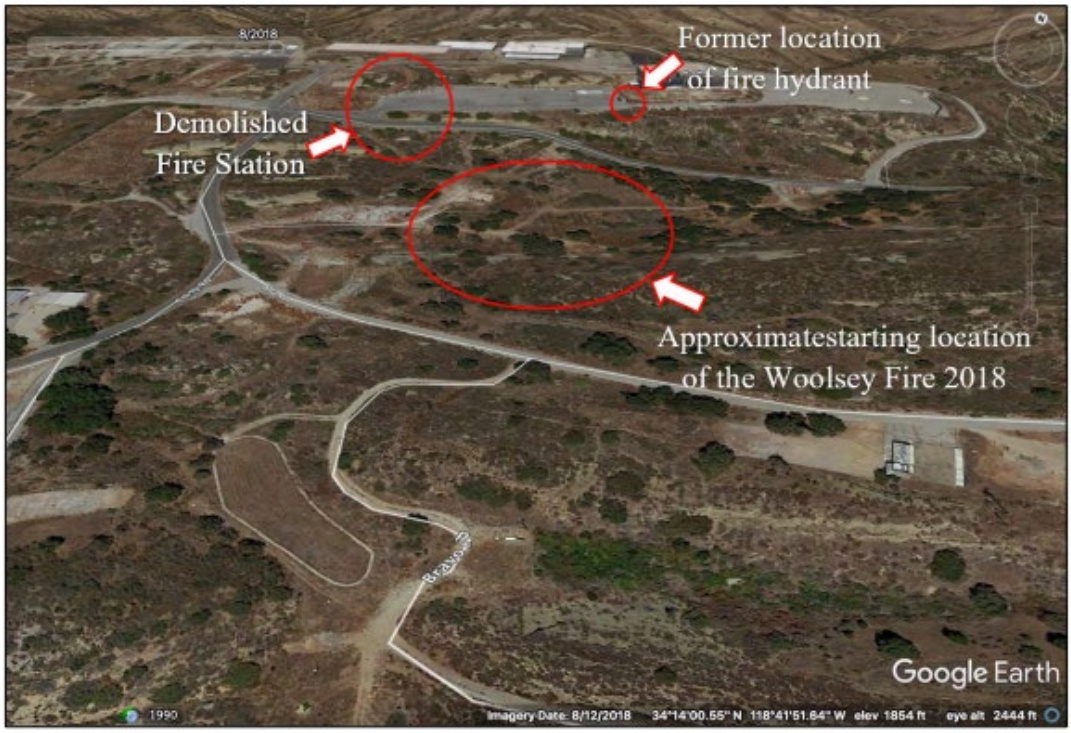
[32] Jaclyn Cosgrove, *Apparatus among 2018 CA Wildfire Issues,* FIREHOUSE.COM (Nov. 11, 2019), https://www.firehouse.com/operations-training/wildland/news/21114021/report-apparatus-trouble-among-problems-during-18-los-angeles-county-ca-wildfire; Daniel Hirsch, et al., *The Santa Susana Field Laboratory and the Woolsey Fire: Could the Fire Spread Have Been Prevented?*, COMMITTEE TO BRIDGE THE GAP (Jan. 8, 2020), https://www.committeetobridgethegap.org/wp-content/uploads/2022/01/CouldTheFireSpreadHaveBeenPrevented.pdf, pp. 7-10.

[33] *Id.*

[34] Daniel Hirsch, et al., *The Santa Susana Field Laboratory and the Woolsey Fire: Could the Fire Spread Have Been Prevented?*, COMMITTEE TO BRIDGE THE GAP (Jan. 8, 2020), https://www.committeetobridgethegap.org/wp-content/uploads/2022/01/CouldTheFireSpreadHaveBeenPrevented.pdf, p. 11.

located just across the road from where the Woolsey Fire ignited.[35] In 2016, NASA also removed 11 water storage tanks that held over 2 million gallons of water, as well as the associated pipelines.[36] These were replaced with two small water tanks that were less than 2% of the prior capacity (just 40,000 gallons) located approximately half a mile from the Woolsey ignition area.[37] If the water tanks and hydrants had still been available, firefighters would have been able to hook their truck directly to a hydrant in the immediate vicinity of the fire without having to leave the area in order to refill.

Figure III-8
Former Fire Suppression Infrastructure[38]



The demolition of the former fire station (with multiple vehicles) and the removal of critical water supplies and suppression systems proved to be disastrous when the single remaining fire truck

[35] *Id.*, pp. 11-12.

[36] *Id.*, p. 13.

[37] *Id.*, p. 13.

[38] *Id.*, p. 12.

broke down during the fire.[39] Cal Advocates speculates that "the Boeing facility's fire engine would have been able to effectively contain the fire or slow its spread until fire agencies arrived" had there only been one ignition.[40] However, Boeing's Type 3 engine had limited capacity (approximately 500 gallons) and quickly ran out of water. As noted in the audio recording that Cal Advocates relies on in its testimony, on the second run, it became overheated and "the engine took a crap."[41] Thus no matter if Boeing had attacked the fire at the Subject Pole or the secondary ignition, the firefighters would have needed to leave the ignition area to refill with water, and the engine was out of service "minutes after leaving the station."[42] The Boeing fire truck's early breakdown undermines any suggestion that the Boeing firefighters would have been able to effectively contain the fire in the early stages or that the ultimate progression of the Woolsey Fire would have been different had there been only one ignition.

[39] Jaclyn Cosgrove, *First engine broke down en route to Woolsey fire, sources say. Blaze grew at a terrifying rate,* L.A. Times (Nov. 11, 2019), https://www.latimes.com/california/story/2019-11-11/woolsey-fire-boeing-truck-fails.

[40] CA-05, p. 20.

[41] Woolsey Fire Agency Report, attachment 23, file "181109_1150_R.mp3" at approximate timestamp 7:37:7:48.

[42] Jaclyn Cosgrove, *First engine broke down en route to Woolsey fire, sources say. Blaze grew at a terrifying rate,* L.A. Times (Nov. 11, 2019),), https://www.latimes.com/california/story/2019-11-11/woolsey-fire-boeing-truck-fails.

Figure III-9
Boeing's Type 3, Older Model Fire Truck

C. Given the Limited Resources Available and the Infrastructure Constraints, an Initial Attack—Even Against Just One Ignition—Would Not Have Been Successful

In the context of wildland fire suppression, an initial attack is "[a]n aggressive action to put the fire out by the first resources to arrive, consistent with firefighter and public safety and values to be protected."[43] If an initial attack is not successful, fire suppression transitions into extended attack.[44] Particularly in heightened fire weather conditions, the initial attack is critical for determining whether a wildfire can be suppressed and contained relatively quickly (like the Hill Fire) or whether it will ultimately burn out of control and turn into a conflagration (like the Woolsey Fire). The effectiveness of initial attack is driven by a number of factors, such as: (1) existing environmental conditions and land use practices; (2) the conditions of the fire upon arrival (e.g., forward rate of spread and flame length);

[43] National Interagency Fire Center, Interagency Standards for Fire and Fire Aviation Operations (Jan. 2025) at 4, https://www.nifc.gov/sites/default/files/redbook-files/RedBook_Final.pdf.

[44] *Id.*, p. 4, defining "Extended Attack" as "Actions taken on a wildfire that has exceeded the initial response."

(3) the number and capacity of ground resources that are first to arrive on scene; and (4) timely support from aerial suppression resources.[45]

On the day of the Woolsey Fire, although a single Boeing fire truck was on scene relatively quickly following ignition, the number of additional ground resources that were available and responded was quite limited and their effectiveness was further constrained by the geography and infrastructure challenges. There also was a critical lack of aerial suppression resources to effectively support an initial attack, even if additional ground resources had been available and responded. Based on one comment from a single witness, Cal Advocates conjectures that the Boeing fire truck might have been able to contain a single ignition at the Subject Pole.[46] However, the complete evidentiary picture indicates that the single Boeing fire truck (even if it had been fully functional and had not broken down), together with the limited county resources, would not have been sufficient to launch a successful initial attack against either of the two ignitions absent significant additional ground and aerial support resources.

The Woolsey Fire was initially reported as two, half-acre fires, and an early photo from just minutes after the ignition shows that the fire at the Subject Pole was growing rapidly and could not have been easily suppressed with the limited available resources.

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[45] *See, e.g.*, Matt Rahn, Initial Attack Effectiveness: Wildfire Staffing Study (2010), p. 2, https://www.iaff.org/wp-content/uploads/2019/05/Initial-Attack-Effectiveness-Study.pdf.

[46] CA-05, p. 20.

Figure III-10
Early Photo of Fire at Subject Pole—2:24 p.m.

The early photo shown in Figure III-10 was taken by a substation employee around 2:24 p.m. and shows a fire rapidly growing in both intensity and size. The darker smoke to the right in the photo, moving toward the southwest, indicates heavier fuels are burning and a higher intensity fire. Due to the terrain and the location of the fire in relation to the road (shown in the foreground of the photo), it is possible that firefighters approaching from the east (left side of the photo) would not have been able to adequately see and assess the full extent of the fire at the Subject Pole from the vantage point of a vehicle on the road, as the leading edge spread away toward the southwest with the prevailing winds.

Figure III-11
Early Photo of Fire at Subject Pole—2:48 p.m.

An additional photo in Figure III-11, taken around 2:48 p.m. by a substation employee, shows a backing fire, backing into the wind in the dry grass to the east of the Subject Pole. This image shows the heel of the fire, while the head or leading edge of the fire is not visible in the frame (would be located to the right and behind the vehicle as the employee evacuated from the site). The heel of the fire is backing *into or against* the wind toward the east, while the head of the fire would be spreading even faster than the heel or flank—running *downwind or with* the wind toward the southwest.

The photo shows smoke that is moving horizontally or parallel along the surface of the ground. This demonstrates the phenomenon known as entrainment, which occurs when air is drawn into a buoyant fire plume, pulling the air and smoke horizontally along the ground surface toward the active flame front. This indicates that the fire at the Subject Pole was vigorously burning and would have required significantly more resources to contain than were available.

Figure III-12
Early Photo of the Woolsey Fire from a Helicopter[47]

Figure III-12 is a photo of the Woolsey Fire in its early stages taken from a news helicopter that was flying adjacent to the Woolsey Fire on its way to the Hill Fire. This photo clearly shows the head or leading edge of the fire that was moving southwest and therefore not visible from the road by the Subject Pole. The photo also shows the smoke column rising at an angle from the fire, indicating a strong wind and other topographic influences on the fire. The visible flames appear to be well over eight feet high. Flame lengths of eight feet are generally considered the upper limit for direct attack with engines and dozers; flame lengths greater than eight feet typically require retardant and air support for slowing the fire's progression.

Given these conditions and the rapid growth of the fire at the Subject Pole, it is not reasonable for Cal Advocates to assume—without any substantive analysis—that the single Boeing truck (which broke down) "would have been able to effectively contain . . . or slow" the fire at the Subject Pole such

[47] Twitter post by Stu Mundel, KCBSKCAL, November 8, 2018, https://twitter.com/Stu_Mundel/status/1060692904107110400. Tweet says "Rocky Peak Bel Canyon fire as it started. We were on our way to the NewBerry Park fire when I took this. @KCBSKCALDesk."

that there may have been a different outcome.[48] To the contrary, the responding county fire agency resources arrived on scene within minutes and promptly began attacking the fire at the Subject Pole,[49] but the fire was growing too fast to be contained and required significantly more resources than were available. As noted, the VCFD initial dispatch fell well short of a full brush response due to drawdown from the Hill Fire, and overall shortages continued throughout the afternoon and evening.[50] Furthermore, the fire agencies quickly ran into the same infrastructure and other challenges as the Boeing firefighters, with limited water supply, poor cell phone service given the remote location, and difficulty communicating via radio because the agencies used different radio frequencies.[51] This meant firefighters needed to congregate in physical proximity in order to change tactics or coordinate equipment and staffing, which further slowed the response.[52] As described by the *Los Angeles Times*, "first responders on the front lines of the Woolsey fire struggled during those first critical hours, stymied by communication breakdowns and a scarcity of air tanker support, equipment and firefighters," in addition to being "hampered by a lack of water."[53]

Moreover, the conditions at the time the Woolsey Fire ignited were conducive to rapid fire growth. For instance, around 2:50 p.m., a crew member on an LA County helicopter estimated the Woolsey Fire to be approximately five acres with a "rapid rate of spread."[54] Arriving units reported "a wind-driven fire growing from five to approximately 30 acres in six minutes."[55] The fire reached 750

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48 CA-05, p. 20.

49 *See* CA-05, p. 20; *see also* LA County After Action Review, p. 24.

50 SCE-04, pp. 8-9.

51 Jaclyn Cosgrove, *Must Reads: Firefighters' fateful choices: How the Woolsey fire became an unstoppable monster*, L.A. Times (Jan. 6, 2019), https://www.latimes.com/local/lanow/la-me-woolsey-resources-20190106-htmlstory.html; *see also* SCE-04, pp. 10-11.

52 SCE-04, pp. 10-11.

53 Jaclyn Cosgrove, *Must Reads: Firefighters' fateful choices: How the Woolsey fire became an unstoppable monster*, L.A. Times (Jan. 6, 2019), https://www.latimes.com/local/lanow/la-me-woolsey-resources-20190106-htmlstory.html.

54 *Id*.

55 LA County After Action Review, p. 24.

acres within the first two hours,[56] and by 7 p.m., it had consumed 2,000 acres.[57] Between 7 p.m. and 9 p.m., as agencies began transitioning from initial to extended attack, it became increasingly apparent to Incident Commanders that they were not likely to catch the fire, and by 9 p.m., it had spread to 8,000 acres.[58] Such a rapid rate of growth required significantly more resources than were available at the time, especially air tankers, and the lack of suppression infrastructure in the area hampered the response even further.

Taken together, the evidence indicates that one or two ignitions in the first several minutes did not make a difference in the overall outcome of the Woolsey Fire. The greatly reduced Boeing firefighting force, which had to contend with a faulty engine that broke down, limited water supplies, and difficulty communicating, was not likely to be effective at stopping or slowing the fire in the early stages. Even after VCFD and other agencies arrived with more resources just minutes later, the response was severely limited by ordinary standards under Red Flag Warning conditions and pursuant to the mutual aid agreement governing the Santa Susana area, as a result of drawdown from the Hill Fire. In my opinion, neither Boeing nor the responding county agencies had enough resources to suppress the fire in the initial attack, whether on their own or in combination; they required significantly more ground resources and aerial support, which were not available because of the Hill Fire.

D. Cal Advocates Does Not Dispute that Sufficient Ground Resources Supported By Aerial Suppression and Retardant Could Have Launched a Successful Initial Attack Against the Woolsey Fire

In my prior testimony, I opined that aerial retardant drops, when paired with sufficient ground resources, would likely have been effective at containing the Woolsey Fire in the first several hours after ignition.[59] Due to the rocky terrain, winds, and fuels in the Santa Susana area, aircraft would have played a critical role.[60] However, because aerial retardant is only effective for two to three hours, it is

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[56] Jaclyn Cosgrove, *Must Reads: Firefighters' fateful choices: How the Woolsey fire became an unstoppable monster*, L.A. Times (Jan. 6, 2019), https://www.latimes.com/local/lanow/la-me-woolsey-resources-20190106-htmlstory.html.

[57] Ventura County After Action Review, p. 3.

[58] LA County After Action Review, p. 59.

[59] SCE-04, pp. 13-16.

[60] SCE-04, p. 22 (citing Jaclyn Cosgrove, *Must Reads: Firefighters' fateful choices: How the Woolsey fire became an unstoppable monster*, L.A. Times (Jan. 6, 2019), https://www.latimes.com/local/lanow/la-me-woolsey-resources-20190106-htmlstory.html.

crucial that sufficient fire engines and ground crews are also available to reinforce the retardant lines. The LA County After Action Review described how high levels of mutual aid resource requests, especially air tankers, went unfilled for hours after the Woolsey Fire ignited,[61] materially limiting the suppression response to the fire.

Nevertheless, with an appropriate fire suppression response, I believe the Woolsey Fire could have been contained within the Santa Susana Canyon area or north of Highway 101, which Dr. Lautenberger in SCE-04 estimates could have avoided or significantly reduced approximately $4.5 billion in fire damages that were incurred south of Highway 101.[62]

Notably, Cal Advocates' testimony does not dispute SCE's showing in this regard. In particular, Cal Advocates' testimony does not dispute that a more robust initial attack throughout the afternoon and early evening hours would have been possible but for the Hill Fire (i.e., if sufficient resources had been available) and could have contained the Woolsey Fire at a smaller size. Likewise, Cal Advocates' testimony also does not dispute that successful early containment could have avoided or significantly reduced approximately $4.5 billion in fire damages that occurred south of Highway 101.

E. Once Early Containment Was Unsuccessful, Any Difference Between a Single Ignition and Two Simultaneous Ignitions Was Immaterial to the Final Outcome

The initial attack against the Woolsey Fire ultimately proved unsuccessful due to resource constraints, the prioritization of the Hill Fire, infrastructure limitations, and fire weather conditions, among other external factors. These challenges persisted throughout the rest of the afternoon and evening of November 8, 2018 and into the overnight hours, and ultimately allowed the Woolsey Fire to jump Highway 101 early on the morning of November 9. Once the fire was not able to be contained, the progression modeling performed by Dr. Lautenberger and described in SCE-04 demonstrates that the fire's progression and ultimate footprint would have been equivalent, regardless of whether there had been a single ignition at the Subject Pole or two simultaneous ignitions at the Subject Pole and the Secondary Span that quickly merged. Cal Advocates does not challenge Dr. Lautenberger's analysis in this regard, which shows that the resulting fire perimeters are nearly identical.[63] This establishes that even in a hypothetical counterfactual where there was only a single ignition, the Woolsey Fire still

[61] SCE-04, pp. 19-21 (citing LA County After Action Review, pp. 28-32).

[62] SCE-04, pp. 31-33.

[63] SCE-04, pp. 29-30.

would have reached the coast and inflicted damage across the same geographic footprint as what actually occurred from the two simultaneous ignitions.[64]

Of course, this is not to suggest that fire suppression was immaterial to combating the Woolsey Fire beyond the initial attack. To the contrary, though the initial attack represented the best opportunity to contain the fire, the availability of additional resources throughout the course of the afternoon and evening and into the overnight hours on November 8, 2018 determined when and whether the Woolsey Fire would ultimately jump Highway 101. Consistent with my prior testimony, if firefighters had received adequate aerial and ground support for Woolsey, particularly in the first several hours before sundown—similar or comparable to what the Hill Fire received—I believe they more than likely would have been able to contain the fire or prevent its spread across Highway 101.[65] That is true irrespective of whether the Woolsey Fire involved two simultaneous ignitions or only a single ignition at the Subject Pole. Without sufficient firefighting equipment and aerial support, however, it proved impossible for the extremely limited ground crews and engines to contain the Woolsey Fire during the early evening and overnight hours.

In sum, fire progression modeling shows that there is no material difference in the Woolsey Fire's ultimate footprint when comparing two simultaneous and nearby ignitions that quickly merged and a counterfactual scenario involving a single ignition at the Subject Pole. The available evidence conclusively demonstrates that resource constraints due to prioritization of the Hill Fire and other limitations on the effectiveness of the fire suppression response—not the fact of one versus two ignitions—was the deciding factor that allowed the Woolsey Fire to burn out of control and prevented it from being successfully contained.

[64] SCE-04, pp. 29-30.

[65] SCE-04, pp. 2, 31-32.

Appendix A

Additional Expert Analyses

Figure A-1
Map of NWS zones within SCE's Territory (2018)

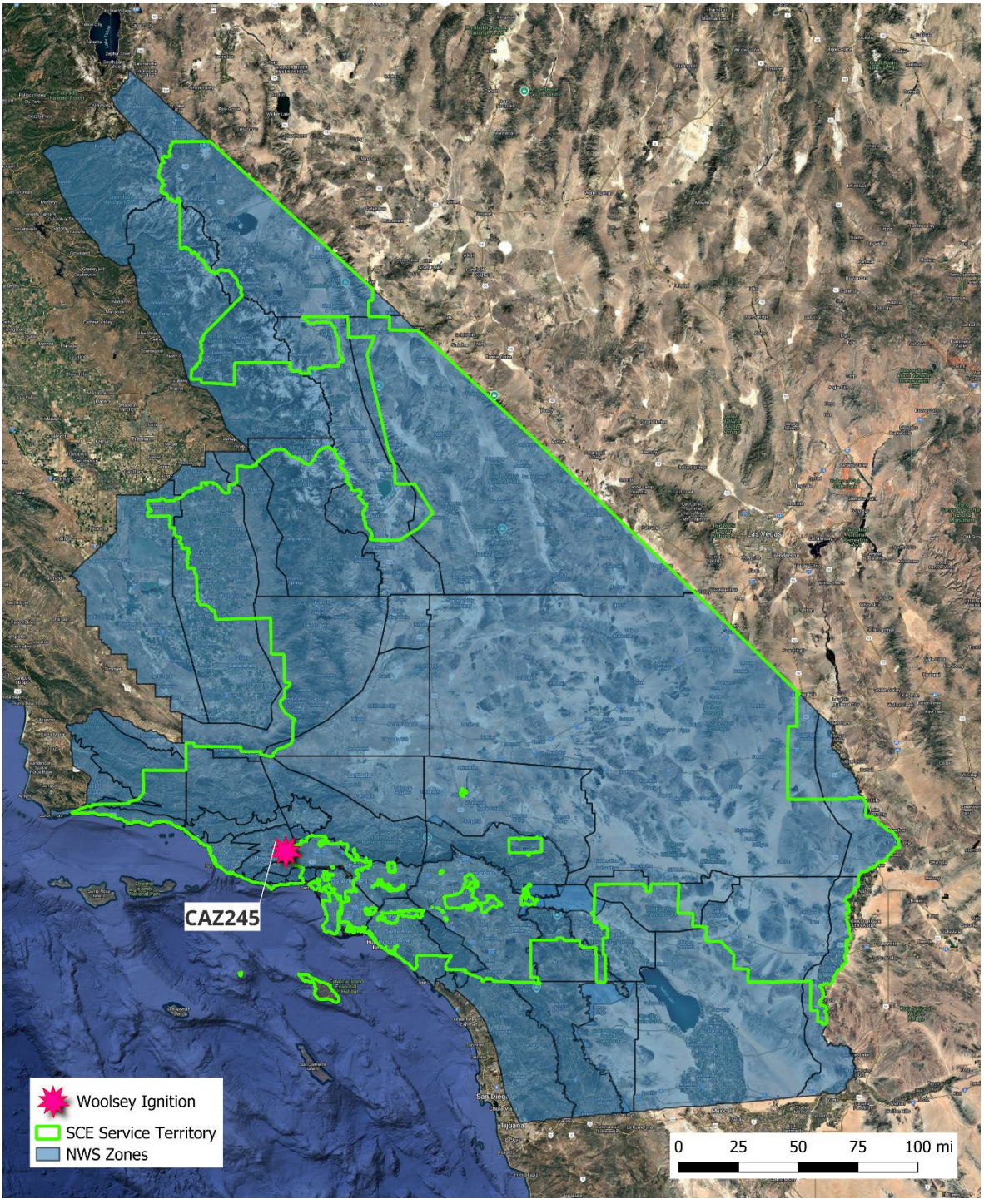

Figure A-2
Fire Frequency in NWS zones within SCE's Territory from 1998 to October 2018

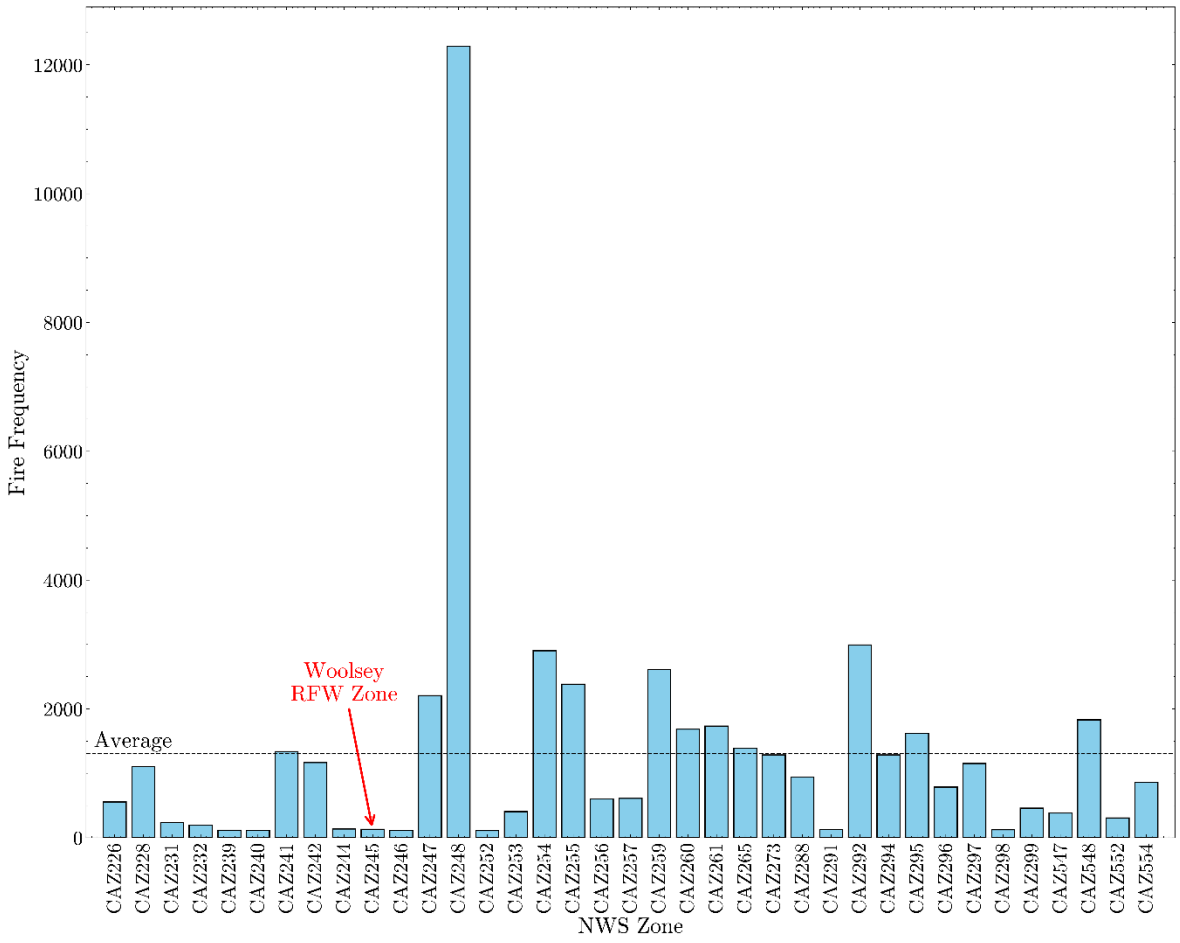

Figure A-3
Total Fire Burned Area in NWS zones within SCE's Territory from 1998 to October 2018