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Marshall Fire Investigative Summary and Review

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Introduction

On December 30, 2021, the Marshall Fire ignited near the intersection of Colorado State Highway 93 and Eldorado Springs Drive. Extreme downslope winds and abundant fuel propelled the wildfire through Louisville, Superior, Marshall, and unincorporated Boulder County. Likely the single most destructive event in Boulder County's history, the Marshall Fire destroyed or damaged more than 1,000 homes and dozens of commercial structures, burned over 6,000 acres, and deeply affected the lives of thousands of Boulder County residents. Tragically, the fire also caused the deaths of 91-year-old Edna Nadine Turnbull, 69-year-old Robert Sharpe, and a significant number of pets. The Marshall Fire was unlike any other wildfire in the history of Colorado in terms of impact on urban areas and the devastation caused.

The Boulder County Sheriff's Office investigates wildfires originating in Boulder County, Colorado. Thus, during the last 18 months, members of the Boulder County Sheriff's Office conducted an extremely thorough investigation with assistance from the Office of the District Attorney, the United States Forest Service, the Colorado Department of Mining and Reclamation Services, the Colorado Bureau of Investigation, several local fire departments, and other experts. The investigation included, among other things, the execution of search warrants, interviews with hundreds of witnesses, evaluation of community tips, forensic analysis, and other judicial processes. The District Attorney's Office reviewed the findings.

Review

As described below, the Sheriff's Office focused on three possible causes of the December 30, 2021, fire. For each one, United States Forest Service special agents and other experts helped the Sheriff's Office investigate, reviewed findings, and generated detailed reports and documentation. The voluminous investigative file is and includes recorded witness interviews, diagrams, police communications, reports, photographs, and video recordings related to the fire. The Sheriff's Office verified the conclusions of consulting experts through video and photographic evidence, witness statements, and other available data. This summary reviews the cause and origin of the fire and explains the conclusions reached by the Sheriff's Office. The

underlying investigative materials, expert reports, police reports, body worn camera videos, and other evidence will soon be available for public review through the Sheriff's Office at this link.

The District Attorney's Office assisted in the investigation and reviewed the evidence, documents, and materials. The District Attorney's Office joins in the conclusions shared in this summary report.

Additionally, the District Attorney's Office considered possible criminal charges. Prosecutors may initiate and maintain criminal charges only if the charges are supported by probable cause and there is sufficient admissible evidence to support a conviction beyond a reasonable doubt. The law and ethical rules require that there be a reasonable likelihood of conviction to bring criminal charges against an individual or corporation. This legal and ethical requirement guides our analysis. Our decision, based on criminal law standards, does not limit any civil action where less stringent laws, rules, and levels of proof apply. Applying this criminal standard, and for reasons discussed in more detail below, no criminal charges will be filed related to the ignition of the Marshall Fire.[1]

The decision of the District Attorney's Office is consistent with the conclusion reached by the Sheriff's Office and the experts. Though the fire devastated thousands of people, there is insufficient evidence that a crime was committed. If new information comes to light through other investigations or civil litigation, the Sheriff's Office and District Attorney's Office will review it.

Investigative Summary

The Marshall Fire, as it is commonly known, comprises two fires. The first originated on residential property at 5325 Eldorado Springs Drive (the "Eldorado Springs Fire"). The second fire originated just south of the Marshall Mesa Trailhead, which is located southeast of the intersection of Highway 93 and Eldorado Springs Drive (the "Trailhead Fire"). Burn patterns, video footage, and satellite imagery show that these two fires eventually merged, though investigators did not determine the precise time or place at which that occurred. Questions related to the merger of the two fires are not relevant here, however, as this cause and origin analysis focuses only on the way the fires started and whether criminal charges can be filed.

A. Climatological and Meteorological Background.

Boulder County, and particularly the southern edge of the county along Highway 93, is no stranger to high winds. In fact, the unbroken ridge of mountains situated just west of the foothills is notorious for its ability to generate wind gusts well over 80 mph. Prevailing winter weather patterns favor strong west-to-east airflow across the United States. Under the right conditions—namely, temperature inversions in which warm air aloft forms a sort of "cap" above the mountains—westerly winds cross the Rockies and are "squeezed" between the mountains and inversion layer. This accelerates the wind and causes it to "crash" into Boulder, much in the

[1] The Boulder County Sheriff's Office and District Attorney's Office recognize that there is ongoing civil litigation relating to the Marshall Fire. This decision letter applies criminal justice standards and thus takes no position on any party's potential civil liability relating to the Marshall Fire.

way water crashes on the downstream side of a river rock.[2] The strongest winds occur at the base of the foothills. Data from the National Renewable Energy Laboratory (NREL) and the National Wind Technology Center show that Boulder sees wind gusts exceeding 80 mph most years, often in December or January.

Even against that backdrop, however, the extreme wind event Boulder County experienced on December 30, 2021, was unusual. NREL, for example, recorded an historic 111 separate wind gusts exceeding 75 mph on December 30, the single-day high in a data set that reaches back to 2001. Wind observation systems located near Fairview High School and Rocky Flats recorded high winds throughout the day with frequent gusts close to 100 mph in the late morning and early afternoon. Windspeeds often are influenced by local terrain, however, and experts with the National Weather Service believe that the data recorded near Fairview High, for example, could have *underestimated* windspeeds by 10-20%.

Additionally, Boulder County had an unusually warm and wet spring in 2021. Wildland grasses grew tall and thick until mid-summer when Boulder County stopped receiving significant precipitation. Indeed, the period from June to December of 2021 was one of the warmest and driest on record in the last 75 years. As a result, in December 2021, wildland grasses were tall, dry, and susceptible to ignition.

When the Marshall Fire ignited, the extreme downslope winds fed it oxygen and pushed it through tall, dry grass down the Marshall Valley—directly toward Louisville and Superior.

B. The Eldorado Springs Fire.

On December 24, 2021, residents of 5325 Eldorado Springs Drive intentionally started a fire on their property. At approximately 11:52 a.m. that morning, the Boulder County Sheriff's Office Communications Center received a call from a community member concerned with the size of the fire. Members of the Mountain View Fire Protection District, a Boulder County Sheriff Deputy, and a Boulder Open Space and Mountain Park Ranger were dispatched. A photo of the fire is included in this summary. (*See* Exhibit 1.)

Residents told responding firefighters they started the burn to dispose of old fencing material, tree branches, discarded pallets, and other junk. The residents explained that they chose December 24 for the burn because the weather was cool, rainy, and overcast. They started the fire in a small depression and had water nearby. Further, they planned to let the fire burn out and use heavy machinery to cover the burn area with dirt. During the December 24 call, these residents informed the firefighters of their plan to bury the fire with dirt.

When interviewed, the firefighters who responded to 5325 Eldorado Springs Drive on December 24, 2021, reported being unconcerned with the fire. Though they observed lumber and larger pieces of wood in the fire, they believed the residents' plan to let the fire burn out and cover the area with dirt was responsible. Firefighters also were reassured by the rainy weather,

[2] Keeping with a wave analogy, as winds move farther east and encounter relatively still air, they experience a "hydraulic jump" and abruptly rise off the surface. In the Marshall Fire, the "jump" zone was likely situated above Lafayette, which is one of the reasons the fire slowed dramatically after it reached Louisville and Superior.

calm winds, and absence of a red-flag warning. Further, firefighters noted the presence of a nearby above-ground pool, which provided a large and readily available source of water should it be needed. The firefighters instructed residents to notify Boulder County Communications Center the next time they initiated a burn. Also, the firefighters told the responding Boulder County Sheriff Deputy it was fine for the fire to continue burning and left the residence. The individual resident who was managing the burn later told detectives he allowed the fire to burn until approximately 5:00 p.m., at which point it had reduced to coals. He covered the coals with dirt but did not add water to extinguish them. In the ensuing days, the resident never saw smoke or other indications the fire continued to burn.

On December 30, the owner of a home on Marshall Drive called 911 to report smoke rising from the 5325 Eldorado Springs Drive property. Mountain View Fire Rescue responded and entered the property from a turnoff located on the east side of Highway 93. On arrival, firefighters saw sparks blowing out of a slash pile that was partially covered in dirt and saw active flames burning light grassy fuels between a shed and a fence that surrounded a large garden. The shed was not yet burning, an observation later confirmed through photographic and video evidence.[3]

The fire, buffeted by strong winds, moved south and east into the garden area. Though firefighters attempted to suppress the fire, they quickly realized that it was "making a run" off the property and toward residential structures situated along Marshall Drive. Firefighters relocated their engine to the intersection of Marshall Drive and Eldorado Springs Drive to protect structures. The firefighters attempted to suppress the fire from this location, but the strong winds showered them with embers—causing one firefighter to suffer burns to his face and neck—and prevented them from applying water. The fire continued to spread south and east, eventually destroying structures in Marshall, Louisville, Superior and unincorporated Boulder County.

Investigators obtained judicially approved warrants to search the 5325 Eldorado Springs Drive property. Members of the Boulder County Sheriff's Office, the Boulder Police Department, the United States Forest Service, and several other agencies participated in the search. Through physical examination, drone footage, thermal imaging, and burn pattern analysis, investigators and experts determined the fire originated from the remnants of the December 24 fire. Specifically, the burn formed a distinctive, narrow "V" shape indicative of a fire ignited by strong winds. The heel of that "V" scar was situated over the area of the December 24 fire and did not extend farther north or west. Additionally, thermal images captured by drone flights on December 31, 2021, showed that the area of the December 24 fire still held significant heat compared to the surrounding ground soils and surfaces.

United States Forest Service Special Agent Travis Lunders concluded that the extraordinarily high winds uncovered the buried December 24, 2021, fire and exposed still-smoldering embers to fresh oxygen. The wind blew these embers across the property and started a grass fire:

[3] This shed, which is seen burning in videos shared widely on social media, was later exhumed, and reconstructed in a complex layer search. Investigators did not discover any electrical service to the shed or other utilities originating in or terminating at, the shed.

> The windblown embers landed in dry grassy fuels along the western fence line of a garden area down wind of the debris burn location. The growing fire ignited chipped wooden mulch which covered the garden surface. Burning wooden mulch was blown across and from the garden in the extreme westerly winds. The exact area of ignition was not located due to the ignition source being consistent with the receptive fuels located near the fence line. The amount of disturbance as a result of the fire suppression effort in and near the specific origin area impacted the investigators' ability to identify the exact area of ignition.

(*See* Exhibit 2.)

In reaching this conclusion, United States Forest Service agents consulted with United States Department of Agriculture researchers at the Missoula Fire Sciences Laboratory. Those experts advised that smoldering combustion may exist for days or weeks after the visible flaming and smoke production has ceased (and can exist for weeks or months under the right conditions). Historic research has confirmed that strong winds impinging on pile burns can ventilate and reignite smoldering material and carry it into adjacent fuels. A summary of this research, including citations, is attached to the expert report addressing the Eldorado Springs Fire.

Notably, investigators developed no evidence that residents at 5325 Eldorado Springs Drive started other active fires between December 24, 2021, and December 30, 2021.[4] At the time of the Marshall Fire, that property housed approximately 40 individuals, including a number of children. Boulder County Sheriff detectives and District Attorney investigators interviewed every adult resident of 5325 Eldorado Springs Drive, and specialized child forensic examiners interviewed each of the children who were present on the day of the fire. Investigators conducted a thorough search of every building located on the property. There was no indication that the December 30, 2021, fire had been intentionally set that day. Investigators also considered, and ruled out, the possibility the fire was caused by lightning, heavy equipment use, smoking, campfires, railroads, incendiary devices, children, spontaneous compost combustion, power lines, shooting, welding, grinding, or pest control. Thus, whether the residents of 5325 Eldorado Springs Drive committed a criminal offense depends on the way they conducted and extinguished the December 24, 2021, controlled burn.

A person may be held criminally liable under Colorado law only when the evidence proves beyond a reasonable doubt every element of an offense defined by Colorado statute. Applying those standards here, the Boulder County Sheriff and Office of the District Attorney conclude that residents of 5325 Eldorado Springs Drive cannot be charged criminally.

[4] Investigators learned that residents of 5325 Eldorado Springs Drive attempted to burn out a large tree stump on December 27, 2021. Experts examined the remains of the stump several times and found no evidence that the fire progressed beyond the stump or escaped from the stump's location. Further, there was no evidence embers escaped from this location and ignited downwind fuels or structures. There were no high wind warnings or red flag warnings on December 27, 2021.

Initially, criminal offenses such as arson require proof that the suspect acted "knowingly" or "recklessly." A person acts "knowingly" with respect to the result of his conduct when he is aware that his conduct is *practically certain* to cause the result. And a person acts "recklessly" when he *consciously disregards a substantial and unjustifiable risk* that a result will occur. Here, there is no evidence that the residents who started the December 24, 2021, fire were aware that it was practically certain that fire would smolder for several days and re-ignite a week later when uncovered by extreme downslope winds. Nor is there evidence that the residents disregarded a substantial and unjustifiable risk that this would occur. The residents intended the fire to burn out before covering it with dirt and did not observe any signs the fire continued to smolder. And, importantly, the firefighters who responded on December 24, 2021, did not believe the fire or method of extinguishment posed any wildfire risk, let alone a substantial and unjustifiable one. The involvement and input from the firefighters who responded on December 24 is inconsistent with "reckless" conduct.

Additionally, neither state regulation nor local ordinances prohibited the December 24, 2021, fire. Generally speaking, Boulder County residents may conduct controlled burns on their property subject to certain limitations and permitting requirements. *See* Boulder County Ordinance 2014-1. The ordinance in place on December 24, 2021, did not prohibit slash or junk burns and required permits only for "open burning." That term, however, was defined as "[a] fire . . . used for grassland or forest management, including vegetative, habitat, or fuel management." This definition did not encompass burning slash and other scrap material.[5] Similarly, 5 Colorado Code of Regulations 1001-11:IV, an air quality control regulation that defines when persons must obtain burn permits , states that persons intending to engage in open burning "may" apply for a permit. The word "may" denotes discretion and should interpreted as permissive, not mandatory. Thus, residents of 5325 Eldorado Springs Drive were not required to obtain a permit before initiating their December 24, 2021, burn.

Given the weather conditions on December 24, 2021, the use of dirt and presence of water to extinguish the fire, as well as the input from firefighters, the December 24 fire did not constitute reckless conduct or violate any other law.

C. The Trailhead Fire.

Through videos obtained by detectives from community members, investigators confirmed that a second fire ignited just south of the Marshall Mesa Trailhead roughly one hour after the Eldorado Springs Fire ignited. Ultimately, investigators and experts concluded that the most probable cause of this ignition was hot particles discharged from Xcel Energy powerlines.

1. Xcel Energy's Electrical Distribution System.

Initial investigation of the Trailhead Fire focused on the possibility it was caused by ember cast from the Eldorado Springs Fire. To that end, wildland fire investigators with the United States Forest Service inspected the Marshall Mesa Trailhead area—encompassing the

[5] Boulder County has since revised Ordinance 2014-1 to require permits for slash burns. Boulder County has also published new guidance for residents who may wish to conduct a burn. Notably, the new materials instruct residents to use water to extinguish fires. This guidance was not available on December 24, 2021.

parking lot, the trailhead, and grassy areas to the south and east—several times in early January 2022. Based on fire indicators, prevailing winds, and the distance from 5325 Eldorado Springs Drive, investigators determined the trailhead ignition almost certainly was not caused by ember cast from the Eldorado Springs Fire. Specifically, the distance between the two ignition points was approximately 0.38 miles, or about 2,000 feet. (*See* Exhibit 3.) Winds on December 30 were both incredibly strong and predominantly from west-to-east, and the Trailhead Fire's ignition point was situated to the *west* of the 5325 Eldorado Springs Drive property. Though topography and other factors can cause winds to temporarily swirl and shift direction, it is highly improbable that an ember could have traveled over 2,000 feet against the prevailing winds and retained enough energy to ignite a second fire.

Investigators then shifted their focus to nearby powerlines, as initial media reports on December 30, 2021, suggested that downed powerlines were responsible for igniting the Marshall Fire. Investigators later determined that those reports concerned a *communications line* that had come down at the intersection of Highway 93 and Eldorado Springs Drive. USFS agents and electrical engineering consultants agreed that this communication line did not carry sufficient electrical current to have started a fire.

While examining the downed communications line, USFS special agents located what appeared to be damage to a transmission line and transformer on the Xcel Energy electrical distribution system that services the businesses and residents near the intersection of Highway 93 and Eldorado Springs Drive. This observation led to a close inspection of the powerlines running south along Highway 93, past the Marshall Mesa Trailhead area. As of January 5, 2022, investigators had not located any additional damage to the area's powerlines.

During the following days, however, Boulder County Sheriff detectives collected images from a motion-activated trail camera they previously had installed at the Marshall Mesa Trailhead to deter motor vehicle trespasses and thefts. The camera was trained on the entrance to the trailhead parking lot but captured, in the background, a section of the Xcel Energy distribution system that runs along Highway 93. A series of photographs retrieved from this camera showed that, between 10:30 a.m. and 11:10 a.m. on December 30, 2021, the eastern "phase"—one of the three powerlines that run across the top of the power poles along the highway—came unmoored from a crossarm and sagged low enough to contact a support brace. (*See* Exhibit 4.) Subsequent photos showed smoke and flames in an area near the base of the pole from which the line disconnected. (*See* Exhibit 5.) Using photos from the game camera, investigators located other witnesses who had visited the Marshall Mesa Trailhead area during and after the fire. These individuals provided additional photographs and videos, confirming that the powerline detached from its insulator before the Trailhead Fire had ignited.

Investigators returned to the trailhead on January 14, 2022, to further examine the area near the disconnected powerline. At the base of the pole, agents located discarded aluminum lashing wires like those that would have been used to attach (or re-attach) a powerline to the crossarm. Nearby, investigators located two specific areas in which the Trailhead Fire may have ignited. Those two areas were 79.6 feet and 110.5 feet from the disconnected powerline. (*See* Exhibit 6.)

The Boulder County Sheriff's Office subsequently retained Paul Way, an electrical engineer and wildland fire expert from the international consulting firm Jensen Hughes. Mr. Way accompanied investigators to the trailhead and examined the powerline in person from an Xcel Energy bucket truck. He observed significant evidence of electrical arcing. At investigators' request, Xcel Energy employees de-energized the line, removed the crossarm and attached powerlines, and transported those items to a laboratory for metallurgical and other analyses.

Laboratory examination of the electrical components revealed several important facts. First, the east conductor, which had come loose on December 30, had significant evidence of electrical arcing. Second, the center phase conductor also had significant evidence of electrical arcing, including one location in which it was missing several grams of aluminum. (Exhibit 7) Finally, Jensen Hughes metallurgists determined that the amount of conductor missing from the center phrase could have retained enough energy to ignite receptive fuels even after traveling to the farther of the two suspected specific areas of ignition (approximately 110 feet). As a result, Mr. Way and investigators concluded that it was more probable than not that hot particles discharged during the extreme wind event on December 30 ignited the Trailhead Fire. Mr. Way concluded as follows:

> The fire in the area of the Marshall Mesa trailhead was ignited by hot aluminum particles produced when the east phase of Xcel Energy circuit 1161 came loose from its insulator and the lashing wire of the east phase contacted the center phase. The evidence examined revealed that the east phase had become detached from its insulator and that there was electrical arcing on the center phase conductor and on the lashing that had held the east phase to its insulator. The arcing on the east phase lashing and on the center phase conductor is conclusive evidence that the two conductors came into contact with each other and produced hot particles.

Over the course of nearly a year, investigators worked with Xcel Energy representatives to obtain data from the electrical transmission system that included the disconnected powerline and other documentary evidence. Analysis of that data tended to confirm investigators' conclusions that the powerlines were the most probable cause of the Trailhead Fire. Specifically, data showed that the circuit with the disconnected line opened and closed several times on December 30, 2021. Circuits open and close in this manner when there is a fault. Though none of the events recorded in Xcel Energy's data occurred at precisely the estimated time of ignition, the opening and closing indicates the system did sustain faults or interruptions on December 30, 2021. Additionally, information from Xcel Energy's system showed that the settings for the circuit protector were not highly sensitive, meaning the event that caused the suspected discharge of hot particles may not have been recorded. Xcel Energy requested and received an opportunity to meet with investigators and provide information. Xcel Energy did not, however, produce any data or other evidence that caused investigators to change their conclusions.

Neither investigators nor outside experts found any evidence of criminally negligent or reckless system design or maintenance. Instead, it appears that the extraordinarily high winds of December 30, 2021, caused the powerline to disconnect and contact other lines, discharging hot

particles into a receptive fuel bed. Based on an exhaustive investigation, there is no evidence that Xcel Energy committed a crime involving their design or maintenance of the line. Thus, no criminal offenses can be proven against Xcel Energy for the role it likely played in igniting the Trailhead Fire.

As noted above, however, investigators close examination of the powerlines did not initially uncover the disconnected phase. This is because, unbeknownst to investigators, Xcel Energy had reattached the line to its crossarm on January 2, 2022. This repair seemed to have possibly been performed in violation of a "do not repair" order that Xcel Energy had issued on December 31, 2021, to preserve the system until a cause and origin investigation could be completed. This gave rise to questions about whether Xcel Energy's decision was intended to interfere with the investigation or alter evidence that might be used in a subsequent criminal or civil proceeding. Thus, investigators requested—through judicially approved search warrants, informal requests for production, and other legal processes—the names of all Xcel Energy employees involved in the repair of the disconnected powerline. The Xcel Energy employees involved in the repair process eventually participated in voluntary interviews with investigators. Those interviews, and all other available documentary evidence, indicates that Xcel repaired the disconnected line on January 2, 2022, solely to restore power to customers. Given the temperatures and snowy conditions, investigators learned that Xcel Energy had been urged to restore power as quickly as possible. Based on the witness interviews and document review, there is no evidence suggesting that Xcel repaired the line to impair physical evidence or interfere with the criminal investigation.

Also as noted above, initial media reports indicated that downed powerlines caused the Marshall Fire. Following these reports, on December 31, 2021, Boulder County's Office of Emergency Management (OEM) published the following Tweet:

> Update on Cause of Fire: Initial reports were of downed powerlines. @XcelEnergyCO has been a very responsive and invaluable partner & after inspection found no downed powerlines in the ignition area.

Given the subsequent discovery of a disconnected powerline along the Marshall Mesa Trailhead, investigators were concerned that this Tweet, though issued by the Boulder County OEM, was intended to mislead investigators, or to improperly deter public officials from investigating Xcel Energy's potential role in causing the Marshall Fire. Thus, investigators focused on personnel involved in communicating this message to Boulder County OEM, as well as the technical definition of the term "downed powerline."

Through the interview process described above, and through consultation with USFS Special Agents and other outside experts, investigators determined that the term "downed powerline" refers to an electrical transmission or distribution line that became detached from its pole and, as a result, contacted the ground. The line involved in the Trailhead Fire, by contrast, is considered a "floater"—a line that detached from its pole but remained suspended in the air and under some amount of tension. As the only other downed line in the "ignition area" was a communications line, investigators determined Xcel Energy's statement—through Boulder

County OEM's Tweet—was true and therefore not intended to improperly influence public officials.

2. Underground Coal Fires.

Though experts determined that Xcel Energy's powerline was the *most probable* cause of the Trailhead Fire, investigators cannot completely rule out the possibility that it was in fact ignited by an underground coal fire located in the same area.

According to the Colorado Division of Reclamation, Mining, and Safety (CDRMS), the Boulder-Weld coal field runs underneath the Marshall Mesa Trailhead. This coal field was actively drift mined between 1863 and 1939, and the specific seam running under the Marshall Mesa Trailhead is now actively burning.

In 2003, the Marshall coal seam was considered "moderately active" and generated surface temperatures between 118°F and 130°F. On December 20, 2005, a surface vent above the Marshall coal seam reached approximately 373°F and ignited nearby grass. To mitigate the risk of future brush fires, the CDRMS placed 275 tons of unwashed aggregate over the vent area. Approximately 10 years later, state officials observed two subsidence features related to the ongoing underground fire. Both areas were excavated, filled, compacted, and graded. Officials located new surface vents during this abatement work, but in all cases the vented air temperatures were lower than 90°F.

When investigators began examining the trailhead area after the Marshall Fire, it was coated in several inches of fresh snow. This enabled investigators to locate several vents where warm air had escaped and melted through the snow. The lack of tracks surrounding the holes confirmed they were coal seam vents rather than animal burrows. Additionally, over the course of their time in the Marshall Mesa Trailhead area, investigators noticed that snow melted more quickly over the areas excavated and backfilled in 2016, suggesting that the surface temperature might be elevated in those areas.

Investigators undertook several steps to evaluate whether the coal seams could have ignited the Trailhead fire. Initially, investigators accompanied CDRMS officials in a search of the area surrounding the Marshall Mesa Trailhead to determine whether an opening to the original mine tunnels could have become exposed and introduced oxygen to the existing fire. They located no such openings.

Next, investigators engaged the private consulting company that contracts with CDRMS. On January 7, 2022, the company sampled ground temperatures and gas discharge from the vents located during the fire investigation and conducted thermal imaging of the Marshall Mesa Trailhead area. The company repeated these steps on January 14, 2022. In both instances, temperatures and gas emissions were consistent with a closed mine atmosphere with minor venting and oxidation but were inconsistent with conditions required to ignite a surface fire. Then, beginning in February 2022, the contractor drilled bore holes in the Marshall Mesa Trailhead area to examine the subsurface temperatures, assess the possibility of underground "hotspots," and install thermocouples to monitor underground temperatures. Data collected

during this process were, again, consistent with minor subsurface oxidation or a very low, smoldering coal fire, and inconsistent with conditions required to start a surface fire.

Finally, though it was impossible to artificially replicate the winds Boulder County experienced on December 30, 2021, the Boulder County District Attorney asked CDRMS to collect new subsurface temperature data following high-wind events in February and March 2022. Though these wind events did not produce gusts equal to those that occurred on December 30, they also did not result in any demonstrable increase in subsurface temperatures. This tends to confirm the experts' conclusion that the underground seam was not exposed to outside oxygen even in the high wind conditions during the Marshall Fire.

In sum, investigators developed no evidence of elevated underground fire activity that could have produced surface temperatures capable of igniting the Trailhead Fire. Nevertheless, because there exists documented evidence of a smoldering coal seam fire and a 2005 surface ignition, coal seam fires cannot be conclusively ruled out as a cause of the Trailhead Fire.

Records

Further information on the Marshall Fire, including many of the investigative materials referenced in this summary, are publicly available on the Boulder County Sheriff's website. Records that have been previously released on this page include the Facilitated Learning Analysis, the updated Marshall Fire Operational After Action Report, and the following documents from the date of the fire: Emergency Notifications from Boulder County Communications Center; evacuation areas, Computer-Aided Dispatch (CAD) reports, audio of calls into dispatch, audio channel traffic, and BCSO employees' body camera videos.

To request other records regarding the Marshall Fire investigation, you must submit a records request at: https://bouldercounty.gov/safety/sheriff/records/. This web page contains information regarding the BCSO's records request process and the fees for the search and retrieval of records.

Conclusion

This report is only intended to address the cause and origin of the Marshall Fire, and the decision on whether criminal charges can be filed. It is not intended to address other topics such as fire behavior beyond the point of origin, response to the fire, recovery from the fire, or potential civil liability.

We recognize the extraordinary impact the Marshall Fire had on the Boulder County community, including the loss of life, pets, homes, and cherished possessions. We would like to thank the investigators and subject matter experts who assisted us with this lengthy and complex investigation. Thank you also to the Boulder County community for your patience during this investigation.

Exhibit 1


WIND
N
LEGEND
Advancing Fire Progression Symbol
Lateral Fire Progression Symbol
Backing Fire Progression Symbol
Item/Point of Interest Symbol

Exhibit 2


N
Hwy 93
Eldorado Springs Dr.
Marshal Mesa Trailhead
Relationship of 5325 Eldorado Springs Dr. GOA and Marshall Mesa GOA (.38 miles)

Exhibit 3

Exhibit 4

Exhibit 5


N
E/KAT20
E/KAT19
E/KAT21
E/JY6
Specific
Origin Area 2
Specific
Origin Area 1

Exhibit 6

Exhibit 7