IRIS Fire Investigations, Inc.

INVESTIGATION REPORT

Schroeder Fire

Case Number: SFMS2160071

Date of Loss: March 29, 2021

ACCREDITED
CERT #4460.01

IRIS Report No. 21-079-3359

April 2021

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April 15, 2021

Jeff Wiedow
Assistant Fire Management Officer
South Dakota Department of Agriculture
Wildland Fire Division
2202 University Ave.
Hot Springs, SD 57747

Information for IRIS Fire Project No.: 21-079-3359TJH

Wildfire:	Schroeder Fire
SD Case Number:	SFMS2160071
Date of Loss:	March 29, 2021
Location:	Rapid City, South Dakota

Dear Jeff Wiedow:

On March 29, 2021, IRIS Fire Investigations, Inc. accepted a request to conduct an origin and cause investigation into a wildland fire west of Rapid City, South Dakota. The wildland fire was named the "Schroeder Fire." The investigation was assigned to Todd J. Hedglin, IAAI-CFI®. The findings and the results of our investigation are contained within this report.

1. DISCLOSURE

In accordance with Rule 26(a)(2)(B) of the Federal Rules of Civil Procedure, Appendix A lists the documents, information, and data we reviewed in the preparation of this report; Appendix B contains the curriculum vitae, which details my qualifications and publications for at least the preceding ten years, my past testimony experience; and Appendix C contains my fee schedule.

2. Personal Background and Qualifications

2a. Todd J. Hedglin

I am an expert in fire origin and cause investigation, scene analysis, and reconstruction. My formal education includes Metropolitan State University and various courses attended while enlisted with the United States Military.

I am an experienced fire origin and cause investigator and hold designations as a Certified Fire Investigator (IAAI-CFI®), Evidence Collection Technician (IAAI-ECT), and Certified Instructor (IAAI-CI) through the International Association of Arson Investigators. I hold the Wildland Fire Investigator's designation (FI-210) through the National Wildfire Coordinating Group (NWCG), Certified Fire and Explosion Investigator (NAFI-CFEI), and Certified Vehicle Fire Investigator (NAFI-CVFI) through the National Association of Fire Investigators. My professional background is based upon 16 years of experience investigating fires and explosions, including prior employment as a fire investigator and firefighter in the fire service.

I provide instruction on the topic of fire investigation to both public and private investigators. The subjects taught range from basic instruction for new investigators to advanced topics for experienced individuals. I am the President of the Colorado Chapter of the International Association of Arson Investigators (CO-IAAI), and the Chairman of The Ethical Practices and Grievances Committee for the International Association of Arson Investigators.

3. SUMMARY OF PROFESSIONAL OPINIONS

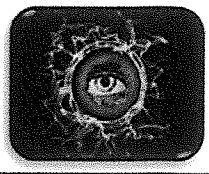
Based upon my analysis of this case, along with my training, education, and professional experience, the conclusions reached in this investigation cover the following distinct areas:

Opinion #1 – The location (general origin area) where smoke and fire were observed was approximately 175 yards southeast of , on top of a small hill at an elevation of roughly 4212 feet. (44°.04'40.09 latitude, 103°.21'55.96 longitude.)

Opinion #2 – The fire cause is coupled with several contributing elements associated with debris burning. Windblown embers or fire was creeping from the control burn area into uncleared vegetation. The coals or ash may be exposed or buried under the soil. The heat from within the pile of ash or buried coals may be retained for hours to days. Ultimately high winds uncovered and moved buried hot embers to additional combustible materials.

The analysis performed, and opinions provided in this case to a reasonable degree of scientific certainty, conform to the generally accepted principles of fire scene reconstruction, analysis and investigation and are based upon the facts and information made available to the date of this report. Evidentiary support is cited within this report to document the basis for the opinions rendered.

If any additional and pertinent information becomes available through first-hand observations, further analysis, fact(s) presented prior to court through depositions or other disclosures, or facts supplied in court which have a direct bearing on this analysis, this report may be amended or supplemented where appropriate. Such information may or may not change the opinions rendered in this analysis.



4. THE STANDARD OF CARE IN FIRE INVESTIGATIONS

This report contains an analysis of a wildfire that occurred on March 29, 2021, west of Rapid City, South Dakota. Using accepted principles of fire investigation[1], this analysis[2] focuses primarily on the cause, development, growth, and subsequent damages of the Schroeder Fire.

The methodology and opinions expressed in this report rely primarily upon the 2021 edition of the National Fire Protection Association's NFPA 921 - Guide for Fire and Explosion Investigations, which was issued by the Standards Council on April 5, 2020, with an effective date of April 25, 2020. The 2021 edition was also approved as an American National Standard on April 25, 2020.

The foundation of fire scene investigations is the use and application of relevant scientific principles and research, in conjunction with a systematic approach and examination of the scene. NFPA 921 identifies the systematic approach recommended is that of the scientific method; the systematic pursuit of knowledge involving the recognition and definition of a problem; the collection of data through observation and experimentation; analysis of the data; the formulation, evaluation, and testing of a hypothesis; and, where possible, the selection of a final hypothesis[3]. This method provides for the organizational and analytical process desirable and necessary in a successful fire investigation.

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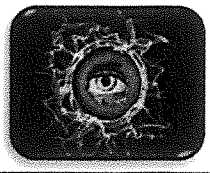
[1]The process of determining the origin, cause, and development of a fire or explosion. "Definitions" NFPA 921Guide for Fire and Explosion Investigations. 10th ed. Quincy, MA: National Fire Protection Association, 2021. 16 Print 3.3.75

[2]The process of determining the origin, cause, development, responsibility, and, when required, a failure analysis of a fire or explosion. "Definitions" NFPA 921Guide for Fire and Explosion Investigations. 10th ed. Quincy, MA: National Fire Protection Association, 2021. 16 Print 3.3.69

[3] "Definitions" NFPA 921Guide for Fire and Explosion Investigations. 10th ed. Quincy, MA: National Fire Protection Association, 2021. 19 Print 3.3.167



The basic concepts of the scientific method are simply to observe, hypothesize, test, and conclude. The scientific method is considered the best approach for conducting fire scene analysis and reconstruction.

The process of the scientific method continuously refines and explores a working hypothesis[4] until arriving at a conclusion or opinion (Appendix D). An important concept in the application of the scientific method to fire scene investigation is that all fires should be approached without presumption.

Until data have been collected, no specific hypothesis can be reasonably formed or tested. All investigations of fire and explosion incidents should be approached by the investigator without presumption as to origin, ignition sequence, cause, fire spread, or responsibility for the incident until the use of scientific method has yielded testable hypotheses, which cannot be disproved by rigorous testing. [5]

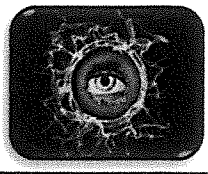
Listed next is an annotated seven-step systematic process[6], based on NFPA 921[7]For applying the scientific method to fire investigation.

1. **Recognize the Need.** A paramount responsibility of first responders is to protect a scene until a full investigation can be started. The investigator should proceed to the scene as soon as possible and determine the resources needed to conduct the investigation thoroughly.

[4] The concept of the working hypothesis is central within the framework of the scientific method. In the case of fire scene reconstruction, the working hypothesis is based upon how an investigator describes or explains the fire's origin, cause, and subsequent development. DeHaan, John and Icove, David. Forensic Fire Scene Reconstruction. 1st ed. Upper Saddle River: Pearson / Prentice Hall, 2004.
[5]NFPA 921 Guide for Fire and Explosion Investigations. 10th ed. Quincy, MA: National Fire Protection Association, 2021. 21 Print Section 4.3.8
[6] DeHaan, John and Icove, David.Forensic Fire Scene Reconstruction. 2nd ed. UpperSaddleRiver: Pearson / Prentice Hall, 2009.
[7] Figure 4.3 – NFPA 921 Guide for Fire and Explosion Investigations. 10th ed. Quincy, MA: National Fire Protection Association, 2021. Print

2. **Define the Problem.** Devise a tentative investigate plan to preserve and protect the scene, determine the cause and nature of the loss, conduct a needs assessment, formulate and implement a strategic plan, and prepare a report. This step also includes determining who has the primary responsibility and authority to interview witnesses, protect evidence, and review preliminary findings and documents describing the loss.
3. **Collect Data.** Data "facts or information to be used as a basis for a discussion or decision" (ASTM 1989). Facts and information about the incident can be collected through direct observations, measurements, photography, evidence collection, testing, experimentation, case histories, and witness interviews. All collected data should be subject to verification. Data collection should include the documentation of the structure(s), vehicle(s), or wildlands involved; construction and occupancy; fuel loading; the processing and layering of the debris and evidence as found; examination of the fire patterns[8]; char depths, calcination, weather, terrain, land use, and the application of electrical arc mapping surveys where relevant.
4. **Analyze the Data (Inductive Reasoning).** Using inductive reasoning, which involves formulating a conclusion based on observations, analyzes all the data collected. The investigator relies on his or her knowledge, training, and experience in evaluating the totality of the data. This subjective approach to the analysis may include knowledge of similar loss histories (observed or obtained from references) training, and understanding of fire dynamics, fire testing experience, and experimental data. Data evaluated can include the pattern of fire damage, heat and flame vectoring, arc mapping, and fire engineering and modeling analysis.

[8]The visible or measurable physical changes, or identifiable shapes, formed by a fire effect or group of fire effects. "Definitions" NFPA 921 Guide for Fire and Explosion Investigations. 10th ed. Quincy, MA: National Fire Protection Association, 2021. 16 Print 3.3.78



5. **Develop a working Hypothesis.** A hypothesis is defined as "a supposition or conjecture put forward to account for certain facts and used as a basis for further investigation by which it may be proved or disproved" (ASTM 1989). Based on the data analysis, develop a tentative working hypothesis to explain the fire's origin, cause, and development that is consistent with on-scene observations, physical evidence, and testimony from witnesses.
6. **Test the working Hypothesis (Deductive Reasoning).** Using deductive reasoning, which involves a conclusion based on previously known facts, the investigator can compare the working hypothesis with all other known facts, the incidents of prior loss histories, relevant fire test data, published treatises, and experiments. Use the working hypothesis to eliminate all other reasonable origins and causes for the fire or explosion, recommend the collection and analysis of additional data, seek new information from witnesses, and develop or modify the working hypothesis. This step may involve reviewing the analysis with other investigators with relevant experience and training (technical review). Interactively repeat steps 4, 5, and 6 until there are no discrepancies with the working hypothesis. A critical feature of hypothesis testing is to create alternative hypotheses that also can be tested. If the alternatives are in opposition to the working hypothesis, their evaluation may reveal issues that need to be addressed. By testing all hypotheses rigorously against the data, those that cannot be conclusive should not be considered as viable.
7. **Select Final Hypothesis (Conclusion or Opinion).** An opinion is defined as "a belief or judgment based upon facts and logic, but without absolute proof of its truth" (ASTM 1989). Only when the working hypothesis is thoroughly consistent with evidence and research can it become a final hypothesis and be authoritatively presented as a conclusion or opinion.

The concept of the working hypothesis is central within the framework of the scientific method. As shown in Appendix E, the investigator molds a working hypothesis and then can modify and refine it by drawing on and examining many sources of information, including past investigative experiences.

NFPA 921 currently suggests two levels of confidence with respect to opinions[9]. A **probable opinion** ranks as a level of certainty corresponding to being more likely true than not. A **possible opinion** ranks at the level of certainty where the hypothesis can be demonstrated to be feasible but cannot be declared probable.

Use of the scientific method dictates that any hypothesis formed from an analysis of the data collected in an investigation must stand the challenge of a reasonable examination by the investigator testing his hypothesis, or by the examination of others.[10]

5. The Schroeder Fire

The subject wildfire named the "Schroeder Fire" was witnessed at approximately 9:22 a.m. on March 29, 2021, about four miles west of Rapid City, South Dakota, around 175 yards southeast of [redacted] atop a hill (44°.04'40.09 latitude, 103°.21'55.96 longitude) near the 1988 Westberry fire burn scar. The fire burn initially spread east, then north to Canyon Road and south to US Hwy. 44 and continued east on private and public lands in grass, brush, timber, and down timber. Smoke was witnessed in the area southeast of [redacted]. The fire was discovered almost

[9] NFPA 921Guide for Fire and Explosion Investigations. 10th ed. Quincy, MA: National Fire Protection Association, 2021. 22 Print 4.5.1
[10] NFPA 921Guide for Fire and Explosion Investigations. 10th ed. Quincy, MA: National Fire Protection Association, 2021. 235 Print 19.6.1

immediately by resident, witness), who described looking from his bedroom window, seeing smoke southeast of his home. He was driving to the area to investigate when he was contacted by a friend who required his assistance. As a result, Mr. did not evaluate the origin of the smoke and did not call 911 at that time.

6. Investigation Tasks

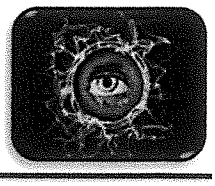
The following tasks were performed during the course of the investigation:

1. I spoke with , witness, and resident on March 31, 2021.
2. I talked to , property owner, on March 31, 2021.
3. I met and spoke with Jeff Wiedow, Assistant Fire Management Officer, South Dakota Department of Agriculture, Wildland Fire Division, on March 31, 2021.
4. I met and spoke with Jay Wickham, Assistant Fire Chief of Operations, South Dakota Department of Agriculture, Wildland Fire Division, on March 31, 2021.
5. I met and spoke with Wayne Yanders, Division Supervisor, United States Forest Service, on March 31, 2021.
6. I met with Sergeant Paul Stevens, Pennington County Sheriff's Office March 31, 2021.
7. I met and spoke with Investigator Cameron Ducheneaux Pennington County Sheriff's Office on March 31, 2021.
8. I conducted an initial wildfire site inspection on Wednesday, March 31, 2021.

7. Interviews

a.

, homeowner, witness, Rapid City, South Dakota, provided the following information on March 31, 2021:



- Between March 14th and 16th, Mr. recalled seeing smoke and fire on top of a hill south of Schroeder road.
- He could not recall the exact date but described it followed a recent snowstorm where snow covered the ground.
- Mr. aid Friday, March 19, 2021, he started on a hike near his home, where he described seeing smoke and fire at or around 9:30 a.m.
- As he approached the burning debris pile, he passed in front of Road.
- Once in the area, he described not seeing anyone in the vicinity.
- He determined the fire was a result of a burning slash or debris pile and continued his hike.
- On Monday, March 29, 2021, while looking from his upstairs bedroom window, he described seeing a "blanket of smoke" in the same location as he described seeing smoke and fire on March 19.
- On March 31, 2021, I contacted Mr. when he returned to the debris area where he was attempting to extinguish a smoldering stump on the east-facing hill below the burn pit area.

b. Wayne Yanders

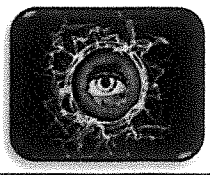
Wayne Yanders, Division Supervisor, Schroeder Fire, United States Forest Service provided the following information on March 31, 2021:

- Mr. Yanders provided an escort to the general origin area.
- He said fire personnel from the Rapid City Fire Department provided an initial response to the fire incident.
- He provided a general overview as to what was observed by initial responders.
- He provided an overview as to the fire spread, movement, and intensity.
- Additionally, he gave a verbal update as to the current status of fire suppression efforts.

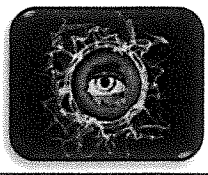
c.

, the homeowner of Rapid City, South Dakota, provided the following information on March 31, 2021:

- The home located at was constructed in 1977.
- It was purchased and occupied by in 1984.
- In February of 2018, a purchase of the property was initiated by and was vacant for two years.
- took occupancy of the residence in late 2019 early 2020.
- He described two separate fire events that took place on the property.
  - *"The first event took place in 2018, where grass areas were burned on the home's east exterior."*
  - *"The second event occurred in 2019, while the home was still vacant, where someone had gained access to the house and placed a stump in the room in an attempt to burn it."*



- Both occurrences currently remain unresolved.
- indicated he did contact law enforcement to report the second event.
- He provided his account of the weather patterns between March 14 – 27, 2021:
  - *Sunday, March 14: Winter storm moved through the region leaving a deep blanket of snow.*
  - *Monday, March 15: Snow continued falling into the morning. Started snowing again in the evening/night. Substantial amount of snow on the ground.*
  - *Tuesday, March 16: Continued snowing into the early morning. Substantial amount of snow on the ground.*
  - *Wednesday, March 17: No visible moisture received. Substantial amount of snow on the ground.*
  - *Thursday, March 18: No visible moisture received. Substantial amount of snow on the ground.*
  - *Friday, March 19: No visible moisture received. Substantial amount of snow on the ground.*
  - *Saturday, March 20: No visible moisture received. Substantial amount of snow on the ground.*
  - *Sunday, March 21: No visible moisture received. Some snow still on the ground.*
  - *Monday, March 22: No visible moisture received. Very little snow on the ground.*
  - *Tuesday, March 23: Snowed during the night.*
  - *Wednesday, March 24: Snow during the night with a layer of snow on the ground in the morning.*
  - *Friday, March 26: Rained in the evening, turning to snow at night.*
  - *Saturday, March 27: Snowed during the night with a layer of snow covering the ground in the morning. Light rain again in the evening.*



assessment of the weather patterns was verified as an accurate account of weather occurrences by reviewing weather history on Weather Underground.

- Additionally, a timeline was provided outlining when the slash pile was ignited and tended to.
- The slash pile was ignited by an employee of named
- Mr. is described by Mr. to be experienced and has a good understanding of burning slash piles:
  - *Sunday, January 24,2021: Burn permit was obtained from South Dakota Wildland Fire.*
  - *Monday, March 15: Pennington County dispatch was advised that we would be burning a slash pile.*
  - *Tuesday, March 16: An employee, ignited the slash pile. The slash pile was from the downed trees left after the 1988 Westberry Trails fire. Additional tree branches from the property had been added to the pile over the past couple of years. burned the pile completely to ashes. He, my wife, and I tended to the fire over the next several days.*
  - *Thursday, March 18: The pile had burned to almost nothing and was nearly out. The pile was turned, multiple times, with a tractor that has a front-end loader and rear-end skip loader. The tractor was used to gather a pile of snow to utilize in the event moisture was needed to douse anything. There was an ample supply of snow covering the entire region, so the pile of snow was not needed or used.*
  - *Saturday, March 20: checked the burn area and observed nothing burning.*
  - *Monday, March 22: I checked the burn area when I returned from a business trip. I took a photo of the property as we flew over it. That*

evening, I went to the burn pile area and observed that it was completely out, and nothing was burning or smoldering. I checked several of the larger pieces that had not burned and observed that nothing was smoldering. I walked completely around the area, checking for any sign of smoke or smoldering. There was none. I took photographs of the area. In the photographs, there is no indication that anything was burning or smoldering.

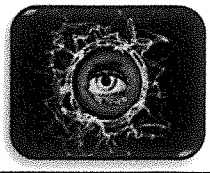
- *Tuesday, March 23: Our employee again checked the area and observed nothing burning or smoldering.*
- *Wednesday, March 24: My wife and I were at the burn pile area for an extended period. There was no sign, whatsoever, of any burning or smoldering. The fire was 100% out.*

- [redacted] provided a brief history of what he described as "Suspicious Items Timeline" and an "Intentional Acts Timeline". These can be reviewed in his written statement.

8. Site Examination

During the initial March 31, 2021 site examinations, I documented the scene with 125 digital photographs depicting the landscape and the surrounding area's condition. A select number of photographs are referenced throughout this report. The South Dakota State Patrol provided additional photographic and video documentation that will also be referenced. A total of one known residential structure and seven other structures were damaged from the Schroeder fire. The property where the fire was discovered is described as the 401.0 - Western Ag Rapid, also known as the Schroeder subdivision. The burn area is 2,224 acres covered with grass, brush, timber, down timber.

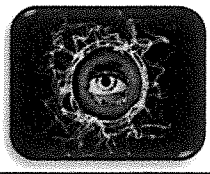
The main access to the property is by Schroeder road from the main road (South Canyon Road). The road winds north and south allowing access to the various lots within the



subdivision. Of the properties in the immediate subdivision area, no known homes were damaged by the Schroeder fire. As the fire progressed, several structures became involved and were damaged by the fire.

On the day of the fire, March 29, 2021, was home. He was in his second-level bedroom. At 9:22 a.m. looking south from his second-level bedroom window, he saw smoke originating from the top of a hill past the tree line. Mr. said he is very familiar with the area and his neighbors. Mr. recalls strong wind blowing out of the west. (Weather history shows a 41-mph wind out of the west at 8:52 a.m. In the following hour, the wind speed decreased to 25 mph with gusts of between 61 and 46 mph. By 11:08 a.m., the recorded wind speed was 51 mph with 68 mph gusts). Mr. said as soon as he observed the smoke, he immediately set out to investigate the source. Mr. was driving to a parking area that allowed him access on foot to assess the source of the smoke. Simultaneously, Mr. was contacted by a friend and neighbor to assist him with what he described as a small burn pit fire. Mr. responded to the request for help. As such, Mr. did not contact 911 to report the fire at that time. Mr. further stated to me he recalled seeing smoke up to three weeks before the fire. He was mindful of the previous debris burning that took place in the same area.

While speaking with the Division Supervisor (Wayne Yanders), he stated that fire personnel from the Rapid City Fire Department provided an initial response to the fire incident. They initiated fire suppression and continued to assist with firefighting operations for an unknown period before the implementation of wildland firefighting personnel. Rapid City Fire Department did not conduct any level of investigation became the responsibility of the Pennington County Sheriff's Office and the South Dakota Department of Agriculture, Wildland Fire Division, in this case. Additional

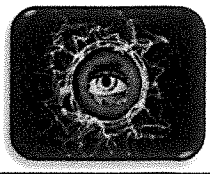


information was provided on the status of burn issued permits, and conditions surrounding when a burn can occur.

During the initial scene exam conducted on March 31, 2021, the area was documented and photographed. The fuel package at the at the general origin area consisted of wood, tree stump, rocks and fire debris. A grid search was not performed as the general origin area was described to have been "turned over" on numerous occasions by heavy equipment.

Before beginning the March 31 exam, I was able to speak with . Mr. provided a brief history of the property in addition to circumstances preceding the March 29 fire in a written statement. Mr. felt very strongly that the March 29 fire was intentionally set. Mr. provided a detailed outline of the precautions taken and the post-burn follow-up that allowed him to conclude the fire had been effectively extinguished. He provided a written and verbal account of events he felt contributed to or was the cause of the fire. The following are derived from Mr. written statement:

> *"There is no doubt in my mind, nor that of my wife, nor that of (our employee), that the slash pile fire lit on the property on March 16 was 100% out. I spent approximately 20 years in emergency services. I started out in search and rescue and as a volunteer firefighter, then in law enforcement. After leaving law enforcement, I again served as a volunteer firefighter, fighting numerous wildland fires. During my time as a firefighter, I obtained Firefighter I and II certifications as well as Wildland and NIMS/ICS certifications. I understand how to ensure that things don't continue to burn and smolder. I am 100% sure the burn pile fire was completely out. There is no question in my mind. In addition, the employee who started and tended to the fire, burns multiple*



slash piles of his own, every year. He is a careful individual who is experienced at burning slash piles. He too, is 100% positive that the slash pile fire was extinguished."

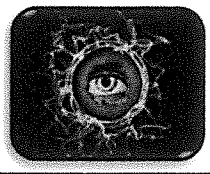
"We have reason to believe the Schroeder Fire was caused intentionally, by an unrelated third party."

After meeting with the Pennington County Sheriff's office, law enforcement investigators were able to eliminate any third-party involvement related to the origin and cause of the March 29 Schroeder fire.

Macro and micro fire indicators were observed in the form of protected areas under cans and rocks, angles of char on trees and brush, foliage on trees and bushes, spalling of rocks, sooting and staining of several surfaces.

The observed patterns were assessed and consistent with fire moving from west to east in the fire development's early stages. As the fire developed, indicators showed fire advancing from the general origin area and spread east down the hill, over the edge, and onto the relatively flat terrain. The fire patterns displayed fire moving east, extending to the north to South Canyon Road and south along Highway 44. Fire also continued east, transitioning into the brush and trees, involving a single residential building and seven additional structures.

The topography and wind conditions were significant factors that contributed to fire movement, intensity, and overall fire conditions. Advancing fire patterns were observed and continued east.



Macro and micro indicator patterns assist with determining the direction of fire travel and intensity. Macro indicators are identified on additional larger items that were involved in the fire. These are commonly, but not limited to, objects such as rocks, trees and fences. Micro indicators are smaller items involved in the fire, but not limited to, items such as sticks, grass, stones, and foliage.

The fire originated from an area four miles west of Rapid City, South Dakota (44°.04'40.09 latitude, 103°.21'55.96 longitude). The overall footprint of the general origin area was roughly 49 yards by 38 yards. This area was located on the top of a hill, spreading down the slope to national forest and private property. The fuel package on the hillside was previously covered with rocks, grasses, and pine trees. A separate 10-foot by 12-foot area of fire was observed to extended southeast of the burn pit. Micro indicators on rocks and clumps of dry vegetation displayed fire movement northwest toward the burn pit and spread latterly east and west. It was later discovered; Pennington County Sheriff's office was conducting their initial site inspection when the spot fire occurred and was extinguished shortly after discovery.

Indicators on trees, rocks and wood debris were found to display some of the following patterns: Protection, Grass Stem, Angles of Char, Spalling, Sooting, Staining and U and V patterns. Several fire pattern indicators can be observed on items both large and small and in various fire phases.

A systematic search of the area was conducted, working in a serpentine pattern from areas of more significant damage to areas of lesser damage by placing colored flags in the ground showing direction of fire travel. I continued working back to the general origin area. Red flags indicated advancing fire, yellow showing transition areas or the edge of the advancing fire. Blue flags indicated backing fire areas; this area displayed

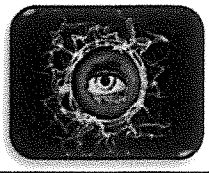
points where fire would move slowly across the ground burning the base or bottom area of an object. In contrast, white flags would indicate potential fire evidence. A limited number of flags were used due to much of the general origin area that was altered by heavy equipment post-fire.

9. Discussion

Based on the investigation, the fire originated was approximately 175 yards southeast of on top of a small hill at an elevation of roughly 4212 feet, 44°.04'40.09 latitude, 103°.21'55.96 longitude. The following competent ignition sources within the area of origin were considered:

1. Lightning
2. Cigarette/Smoking
3. Glass reflection/refraction
4. Incendiary (Arson)
5. Debris burning

The wind was recorded at 8:52 a.m. to be between 41 and 64 mph from the west. The wind speed one hour earlier was reported at 37 mph, windy, and skies were clear. Between 8:52 a.m. and 6:52 p.m., the wind speed increased to a steady as high as 58 mph, with gusts to 75 mph. The wind was a contributing factor in the rapid spread of the fire. There were not any thunderstorms reported on the day of the fire. No physical evidence of a lightning strike was observed, nor were there any reports of lightning in the area. A STRIKEnet® report was generated (Report#18191227). A three-mile radius search was evaluated beginning March 28, 2021, through March 30, 2021. The report verified there were zero cloud-to-ground lightning strokes detected within three miles of the provided coordinates. Therefore, a lightning strike was eliminated as the cause



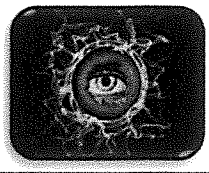
of the fire. At the time of the fire, the temperature was 65°F, the humidity was reported to be 14%.

Smoking activities and/or improperly discarded smoking materials, including matches, cigarettes, cigars and pipes were considered as a possible competent ignition source. The general origin area was flagged with yellow scene tape by law enforcement officials before my scene investigation on March 29. I visually searched the general origin area for evidence of the smoking material. No smoking materials were present in the general origin area. However, it should be noted that the area had been processed and turned over numerous times by heavy equipment before my initial on-site investigation. Additionally, and his wife are non-smokers; was also reported to be a non-smoker.

Physical placement of the cigarette is an important factor. It should be noted that what is important is what the cigarette position was when it ignited the fuels, not its final resting place after the fuels ignited and burned. In many instances, this may not be possible to precisely determine. To increase the chance for a cigarette ignition, 30% + of the glowing tip needs to be in contact with the fuel bed. The tip should be oriented into the wind and may be burrowed or downslope of the non-burning end.

Smokers normally do not discard full-length cigarettes. The length of the ash remains should be examined and consideration given to being part of a time-delay incendiary device. Consider altered cigarettes such as a matchhead device, cut back behind suppressant rings.

When considering the circumstances related to a possible cigarette caused fire, the weather and fuel bed conditions should be compared to the requirements



provided in this field guide. Besides the physical placement of the cigarette remains, signs of human activity may be present in or near the origin area.[11].

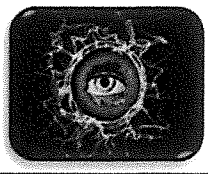
Environmental factors include: Finely particulate fuel bed, Loose fuel arrangement, Fine dead fuel moisture less than 14%, Microclimate location (temperature at the ground level vs. temperature at higher level). The temperature at ground level can vary significantly from those taken at eye level or at 20-foot levels. In addition, a relative humidity of 22% or less.

The fuel bed arrangement consisted of ground level plants and grass, scrub brush, dirt and rocks. It is unknown as to the moisture content of the ground level vegetation at the time of the fire. The relative humidity on March 29, 2021, at the time of the fire, was between 16 and 25%.

Total burn time of a cigarette is approximately 12-15 minutes (1 inch in four minutes). Most people discard a cigarette that is almost totally consumed, therefore, the fuel bed's typical exposure to heat is approximately one to two minutes[12].

Given the fuel bed and configuration, temperature, humidity and overall time, a fire associated with smoking material would be inconsistent and not viable given the data collected during this investigation. As a result, it can be eliminated as a viable ignition scenario and cause of the fire.

[11] National Wildfire Coordinating Group. 2016 Guide to Wildland Fire Origin and Cause Determination, PMS412/NFES 1874, chapter 6, page 209 paragraphs 3, 4 and 5
[12] National Wildfire Coordinating Group. 2016 Guide to Wildland Fire Origin and Cause Determination, PMS412/NFES 1874, chapter 6, page 208 paragraph 4



Refraction or reflection of sunlight was considered a potential competent ignition source: Fires that occur because of refraction or reflection from sunlight are rare. For this to have occurred, an object with the correct properties must be present.

> *Objects known to have caused fires include cut crystal, clear glass bottles filled with a clear liquid, headlight lenses, mirrors, old window glass (bubbled), unfrosted aerosol can bottom, polished metal, and clear plastic bags filled with water or other clear liquid*
>
> *Fires started by glass refraction or reflection are very rare occurrences. This cause may have to be considered due to the presence of an object at the origin with the potential for starting a fire. Flat broken glass, lacking magnification or reflective properties, as well as colored glass will not start fires*[13].

The general origin area where the fire started, and a systematic search of the hilltop, did not produce any evidence of glass bottles or items known to cause refraction and reflection. During the evaluation of the general origin area, no glass or plastic bottles were found. Additionally, the sun would be required to be in the correct alignment with the object to produce such an effect. As a result, refraction and reflection were eliminated as a viable ignition scenario and cause of the fire.

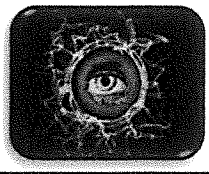
An incendiary or deliberately set fire was considered as a cause of the fire. Statements in the verbal and written form provided by Mr. outlined a hypothesis suggesting a third party was responsible for the March 29, 2021, Schroeder fire. The collected information was provided to Pennington County Sheriff's Department for further investigation. After speaking with the law enforcement officials, it was

[13] National Wild fire Coordinating Group. 2016 Guide to Wildland Fire Origin and Cause Determination, PMS412/NFES 1874, chapter 6, page 286 paragraph 1 and 2

determined any third-party involvement with the fire's ignition could be eliminated as a cause of the fire. Subsequent information related to any third-party incendiary or deliberately set fire would need to be addressed by the Pennington County Sheriff's Office.

Debris burning was evaluated as a competent ignition source of the fire. Mr. provided a copy of a burn permit obtained from the South Dakota Department of Agriculture, Wildland Fire Division, dated January 24, 2021, and set to expire March 31, 2021. On Monday, March 15, 2021, Mr. said he advised the Pennington County dispatch center he would be burning a debris/slash pile. The pile was described to be approximately eight to ten feet in height and up to sixty feet in length, as it was a large pile requiring a minimum of six inches of snow. The contents of the debris pile consisted of downed trees from the 1988 Westberry Trails fire. Added tree branches, wood, stumps, and various other items from the property had been added to the pile. The debris pile was described to have been built up over a long and unknown period of time. The debris pile area was on top of a hill approximately 175 yards southeast of Rapid City, South Dakota.

Tuesday, March 16, an employee of ignited the slash pile. Mr. described Mr. allowed the pile to burn until only coals and ashes remained. Mr. , his wife, and Mr. were said to have tended to the fire over the next several days. By March 18 the debris/slash pile was described to have been almost "burned to nothing" and was nearly out. The pile was said to have been turned multiple times with a tractor to ensure the coals were mixed. On page 15, paragraph three of this report, Mr. described his actions on March 22 (listed below):

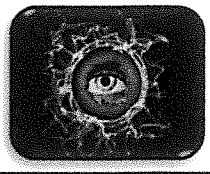


"Monday, March 22: I checked the burn area when I returned from a business trip. I took a photo of the property as we flew over it. That evening, I went to the burn pile area and observed that it was completely out, and nothing was burning or smoldering. I checked several of the larger pieces that had not burned and observed that nothing was smoldering. I walked completely around the area, checking for any sign of smoke or smoldering. There was none. I took photographs of the area. In the photographs, there is no indication that anything was burning or smoldering."

Mr. described the debris/slash pile to have been entirely extinguished by March 24, 2021.

Wildfires related to debris/slash pile escapes are known to be one of the leading specific causes of wildfires. The ignition considerations are similar to that of campfire escapes. Embers from the fire can often remain under a layer of already cooled coals for hours and even days and may very well go unnoticed.

Discernible spread pattern originating from the perimeter of the debris burn. Windblown embers generally land within 40 feet of their source. Cardboard and paper form competent aerial firebrands and are often present in residential debris-burning activities. The debris pile or burn barrel will be present and discernible at or upwind of the ignition area. When burning is being done in a barrel, defective screens (burnt out, too small for size of barrel, or mesh that is too large) or no screen is present. The barrel itself may be defective and have holes not covered by a screen either deliberately cut into the barrel or simply from rust or burn through. Inadequate clearance is often a primary circumstance associated to both residential and industrial debris burning escapes. The failure to have



suppression tools present can play a role in establishing possible negligence. Signs of suppression efforts by the property owner or others may be present.

The general origin area for the Schroeder fire was upwind of the initial burn path that extended east and down the hill.

Lack of attendance is a common circumstance in debris-burning escapes. This includes both residential and industrial debris burning activities. Failure to attend a residential debris burn typically can result in a delayed escape of minutes to days.

It was established through a verbal and handwritten statement by Mr. ı that Mr. ınd he both watched the burn area for an extended period up to March 24 and concluded the fire was, in fact, out by their account.

Escaped fires originating from large slash burning operations should be treated generally the same as other debris burns. Their size, and the fact that they may hold over for an entire winter do create additional considerations. Industrial debris burning, such as logging slash or other forest industry pile burning, can develop ash crusts similar to that described in the section on campfires, creating residual heat for months. Often, by the time these larger industrial burn piles are exposed and become active again, forest debris such as leaves and needles have covered any attempts at control lines around the piles, allowing the fire a path of escape by direct burning or windblown ember.

Fires may surface from clearing and brushing activity well after the original materials were burned. They may also surface from burning in the ground where no brush pile exists. There are numerous documented instances where these fires

having escaped the following spring after being originally burned the preceding fall. This may be due to a mixture of dirt and ash which insulates the hot embers within the debris that is piled by these activities[14].

Patterns leading from the burn pile's east edge extend from the burn pile into the grass and additional dry fuel bed. Although six or more inches of snow were present when the pile was ignited, the snow had melted away and exposed the fuel package. Between the time the snow melted and fire ignition on March 29, the above-ground fuel bed had time to dry and allowed for a more competent fuel source.

The time frame is consistent with an escape, given the initial ignition, size and length of burn time of the pile. The pile was ignited on March 16 and was described to have burned until March 24; this time frame would be well within a fire escape timeline. The fire occurred then on March 29, 2021. Dry grass, brush, and additional fuels were present on all sides of the pile. An escape from a debris/slash pile can not be eliminated as the cause of the March 29, 2021, Schroeder fire.

10. Fire Cause Analysis

The results of the investigation conducted by IRIS Fire Investigations indicate the following:

- The fire's general origin area was approximately 175 yards southeast of the , Rapid City, South Dakota.
- This location where the initial smoke and fire were observed was on top of a hill located at 44°.04'40.09 latitude, 103°.21'55.96 longitude.
- The first fuel ignited was brush and grass.

[14]National Wild fire Coordinating Group. 2016 Guide to Wildland Fire Origin and Cause Determination, PMS412/NFES 1874, chapter 6, pages 211 paragraph 4 and page 212 paragraph 1-3

- Lighting, Cigarette/Smoking, Glass refraction/reflection, Incendiary (arson) were eliminated as causes of the fire.
- The fire cause is related to hot embers emitted from the burn area which contacted dry vegetation that resulted in the subsequent fire.

In this case, the analysis and opinions provided to a reasonable degree of scientific certainty conform to the generally accepted fire scene reconstruction principles and investigation. They are based upon the facts and information made available to the date of this report. Evidentiary support is cited within this report to document the basis for the opinions rendered.

If any additional and pertinent information becomes available through first-hand observations, further analysis, facts presented to experts prior to court through depositions or other disclosure, or facts supplied in court which have a direct bearing on this analysis, this report may be amended or supplemented, where appropriate. Such information may or may not change the opinions rendered in this analysis.

Sincerely,

Todd Hedglin
Investigator

TJH:rkt

Appendix A - Documents, Information, and Data

1. Weather report, Weather Underground, for March 14-31, 2021.

2. National Fire Protection Association (NFPA) 921, Guide for Fire and Explosion Investigations, 2021 Edition.
3. National Fire Protection Association (NFPA) 1033, Standard for Professional Qualifications for Fire Investigations, 2014 Edition.
4. National Wildfire Coordination Group (NWFCG) FI-210, Wildland Fire Origin and Cause Determination workbook, 2016 Edition.
5. National Wildfire Coordination Group (NWFCG) Schroeder Fire SD-SDS-210165 Progression Map, 3/31/2021.
6. https://inciweb.nwcg.gov/incident/7356/
7. WildCAD Incident Card - GREAT PLAINS INTERAGENCY DISPATCH CENTER: "Schroeder" Wildfire 03/29/2021 09:22:00 Order Number: SD-SDS-210165 Area LAKES (LAKES)
8. `
9. ota.
10. Schroeder Fire Incident Status Summary (ICS-209)
11. Emergency Services Communications Center CFS-Command Log April 13, 2021.
12. STRIKEnet® report #18191227.

Photographs

IRIS Photographs (125)
South Dakota State Patrol Arial Photographs (1077)

Appendix B – Curriculum Vitae

NAME:

Todd J. Hedglin, IAAI-CFI®, ECT, CI, NAFI-CFEI, CVFI, FI-210
Operations Officer/Fire Investigator, IRIS Fire Investigations, Inc.
99 Inverness Dr. East, Suite 160
Englewood, CO 80112

EDUCATION:

South West Adams County Fire Academy, Denver CO, 1995
Franktown Fire Department Fire Academy, Franktown Colorado 2003
North Washington Fire Department Academy, Denver Colorado, 2004
NIMS for ICS Levels 100, 200, 700, 800
Metro State University, General Studies 1994-96
US Military Schools and Education 2000- Present

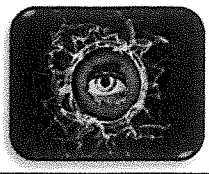
PROFESSIONAL AFFILIATONS, CERTIFICATIONS & LICENSES:

- Certified Fire Investigator, International Association of Arson Investigators (IAAI-CFI) Certificate #41-050817.
- Certified Instructor, International Association of Arson Investigators (IAAI-CI)
- Certified Evidence Collection Technician, International Association of Arson Investigators (IAAI-ECT) Certification # 155
- Pro-Board Fire Investigator, # 333010 National Board on Fire Service Professional Qualifications (accrediting group for IAAI-CFI)
- Certified Fire and Explosion Investigator, National Association of Fire Investigators (NAFI-CFEI) Certification #15420-8393
- Certified Vehicle Fire Investigator, National Association of Fire Investigators(NAFI-CVFI) Certification # 15420-8393v
- Wild land Fire Investigator FI-210, National Wildfire Coordinating Group (NWFCG-FI-210)
- Certified Firefighter Level 2, Colorado Division of Fire Prevention and Control (CDFPC-FF2) Certification # IFSAC-956786
- Driver Operator Pumper, Colorado Division of Fire Prevention and Control (CDFPC-DOP) Certification # IFSAC-1307200
- Hazardous Materials Technician, Colorado Division of Fire Prevention and Control (CDFPC-Hazmat Tech) Certification # IFSAC-1242865
- National Registry Emergency Medical Technician (NREMT) Certification # B1590444
- Emergency Medical Technician, Colorado Division of Transportation, Division of Health (EMT) Certification # 008520
- International Association of Arson Investigators - Member # 1304660
- Colorado Chapter – International Association of Arson Investigators – Member # 755
- National Association of Fire Investigators – Member # 15420-8393

PROFESSIONAL COURSES & SEMINARS:

National Fire Academy, Emmitsburg, MD.

- Expert Witness & Courtroom Testimony Course (March. 2011)
- Fire/Arson Investigation Course (April. 2008)



International Association of Arson Investigators

- IAAI Annual General Meeting and Seminar (April 2019, Jacksonville FL)
- IAAI Annual General Meeting and Seminar (May 2018, Frisco TX)
- IAAI Annual General Meeting and Seminar (April 2017, Las Vegas NV)
- IAAI Annual General Meeting and Seminar (April 2016, Orlando FL)
- IAAI Annual General Meeting and Seminar (April 2015, Chicago IL)
- IAAI Annual General Meeting and Seminar (April 2014 Las Vegas NV)
- IAAI Annual General Meeting and Seminar (April 2013, Orlando FL)

National Association of Fire Investigators

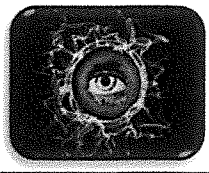
- NAFI Fire/Arson Investigation Seminar (May 2010, Sarasota FL)
- NAFI/PATC Vehicle Fire Investigations (August 2017, Denver CO)

Colorado Training

- CIAAI Annual Meeting and Seminar (October 2019, Vail CO)
- CIAAI Annual Meeting and Seminar (October 2018, Vail CO)
- Kirks Fire Investigation 8th edition update (January 2018, Littleton CO)
- CIAAI Annual Meeting and Seminar (October 2017, Vail CO)
- PATC Hands-on Vehicle Fire/Arson Investigation (Denver, Aug 2017)
- CIAAI Annual Meeting and Seminar (October 2016, Vail CO)
- CIAAI Annual Meeting and Seminar (October 2015, Vail CO)
- CIAAI Annual Meeting and Seminar (October 2014, Vail CO)
- CIAAI Annual Meeting and Seminar (October 2013, Vail CO)
- CIAAI Annual Meeting and Seminar (October 2011, Vail CO)
- CIAAI District Three Training (August 2013, Denver CO)
- CIAAI District Training, Forensic Fire Scene Photography (June 2011 Loveland CO)
- International Code Council (ICC) Fire Safety Plans Review – Non-Tested 8 hours
- International Code Council (ICC) Commercial Plans Review – Non-Tested 8 hours
- Psychological profiling of the fire setter, Center for Arson Research (August 2011, Denver CO)
- PATC Fatal Fire Scene Investigation, Fire Fighter Fatality Investigation (October 2010, Denver CO)
- PATC Fire Fighter Investigation of Serious Injury or Death (February 2011, Loveland CO)
- Colorado Bureau of Investigation, 'Fire and Crime Scene Evidence Collection (February 2008 Lakewood, CO)
- National Wildfire Coordinating Group / Colorado Wildfire Investigations FI-210 (June 2014, Glenwood Springs, CO)

Additional Training

- Impact of Ventilation on fire Patterns/ Fire Fighter Safety Research Institute UL Feb 2021, Dan Madrzykowski
- Advanced Topics in Fire Investigation/Fire Investigator Protect Your Self (July 2019) IRIS Fire Investigations: David Icove, Tom May, Robert Toth
    - Standards in Fire Investigation
    - ISO Accreditation



  - Advanced Documentation
  - Management of Fire Investigation Units
  - Constructing the Perfect CV
  - Kinesic Interviewing and Exercise
  - Expert Reports, Best Practices
  - Expert Witness Pre-Trial Preparation
  - Strategies and Tactics of Opposing Counsel

- International Association of Special Investigative Units/Iowa-Nebraska
  - How one day can change your life/Chief Mark Bowersox, Iowa City Police Department
  - Understanding and Interviewing an Individual with a mental Illness
  - Methamphetamine Lab Investigations and Awareness
  - Communication Counts: Insight for Investigators
  - Fire Investigation from Assignment to Verdict
  - Vehicle Theft Forensics and Anti-Theft Devices
  - Jury trials – From Jury Selection to Expert Testimony
- DOT Security Awareness Training as per 49 CFR 172.704(a)(4) (September 2016)
- DOT Hazardous Materials Transportation as per 49 CFR 172.704(a)(1)(3) (June 2016)
- Compliance Solutions Asbestos Awareness Course, (March 2016 Littleton CO)
- HAZWOPR 40-hour, Refresher Course, (October 2016 Littleton CO)
- AEI Corporation Fire Sprinkler Systems and the Legal \ Aspects of Loss.
- AEI Corporation - Basic Origin and Cause 101, seminar.
- The Process of Conducting a Fire Investigation, Electricity and the Investigation, Propane and the Investigation, Panel Discussion about the effects of Negative corpus and Daubert Challenge
- AEI Corporation – Myths of Electric Fires.
- AEI Corporation – Electricity and Fire Investigations.
- AEI Corporation – Wood Frame Structure Assessment
- CFI Trainer – www.cfitrainer.net
  - An Analysis of The Station Nightclub Fire
  - Arc Mapping Basics
  - Certified Instructor Test
  - Critical Thinking Solves Cases
  - Digital Photography and the Fire Investigator
  - DNA
  - Documenting the Event
  - Ethics and the Fire Investigator
  - Evidence Examination: What Happens at the Lab
  - Explosion Dynamics
  - Fire and Explosion Investigations: Utilizing NFPA 1033 and 921
  - Fundamentals of Interviewing
  - How First Responders Impact the Fire Investigation
  - Introduction to Evidence
  - Introduction to Youth-Set Fires

- Investigating Fatal Fires
- Investigating Fire and Explosion Incidents Involving a Line-Of-Duty Death
- Investigating Motor Vehicle Fires
- MagneTek: A Case Study in The Daubert Challenge NFPA1033 and Your Career
- Physical Evidence at the Fire Scene
- The Deposition Part 1: Format, Content, and Preparation
- The Practical Application of the Relationship Between NFPA 1033 and -NFPA 921
- The Scientific Method for Fire and Explosion Investigation
- Thermometry, Heat, and Heat Transfer
- Understanding Fire Through the Candle Experiments
- Wildland Fires Investigation
- Writing the Initial Origin and Cause Report
- CFI Trainer - Podcast Wildfire Loss from ammunition

BACKGROUND & EXPERIENCE:

Operations Officer, Fire Investigator, IRIS Fire Investigations, Inc., Englewood, Colorado. Manage daily operations; investigate the origin and cause of residential, commercial fires, explosions, and wildland fire. Write and review reports, document, photograph, sketch, conduct interviews, and research. Provide instruction on topics related to the origin and cause for Fire and Explosion Investigation, Fire Dynamics, Fire Behavior, Arson, Wild Land Fire Investigation.

Tech Sergeant /4N Medical Technician, US Airforce, Aurora CO, Cheyenne WY
Supervise junior airman, provide guidance for additional medical personnel and administrative projects. Provide medical care to critical and non-critical sick and injured patients. Provide initial and ongoing CPR, AED, and Combat Lifesaver training to military personnel. Draft reports. Provide immunizations, draw blood, document accordingly. Function as a lead medical technician in field operations.

Fire and Explosion Investigator, AEI Corporation, Littleton, Colorado. Investigate the origin and cause of residential, commercial fires, explosions, and wildland fire. Write and review reports, document, photograph, sketch, conduct interviews, and research. Provide instruction on topics related to the origin and cause for Fire and Explosion Investigation, Fire Dynamics, Fire Behavior, Arson, Wild Land Fire Investigation.

Firefighter, Investigator, Hazmat Tech, EMT, North Washington Fire Rescue, Denver, Colorado
Firefighter 1st class performs technical work and labor required to protect life and property. Responding to Fire incidents, Hazardous Materials, and Medical and Trauma situations, Transport of sick and injured patients. I served as a member of the honor guard. Fire/ Arson Investigator Investigate all fire-related incidents for origin and cause, Arson. Serve as the engineer, driver, or operator for any company apparatus. Serve as an acting company officer. Instruct CPR and public and educational facilities. Function as Lead HAZMAT Technician for the shift, assist with coordination for training and lead on calls.

Corpsman HM1 SCW/FMF, US Navy, Aurora Colorado, IRAQ.

Supervise junior corpsman, provide guidance for additional medical personnel and administrative projects. Provide medical care to critical and non-critical sick and injured patients. Provide initial and ongoing CPR, AED, and Combat Lifesaver training to military personnel. Process and maintain Battalion medical readiness for 700 additional staff over ten states, maintaining a 96% level of preparedness. Maintain battalion medical records, draft reports. Provide immunizations, draw blood, document accordingly. Function as a safety officer and preventative medical technician for on-site work projects.

Fire Investigator, Higgins & Associates, Morrison Colorado.
Investigate the origin and cause of residential, commercial fires, explosions. Write and review reports, document, photograph, sketch, conduct interviews, and research. Provide instruction, present at seminars. Serve as liaison between fire department personnel and the company concerning fire investigations, fire code enforcement, and collection of documents from fire or explosion events. Provide documentation about construction defect cases — document and conduct failure analysis for testing.

Sergeant/EMS, Coordinator Castle Pines Emergency Services, Castle Rock Colorado
Shift supervisor responsible for day-to-day operations that included covenant and code enforcement, traffic safety and enforcement, and access control. Respond to medical, fire, and domestic-related emergencies or any call for assistance. Received Division of Wildlife training to assist with wildlife problems. Assigned as Emergency Medical Services Coordinator, maintained all patrol officer certifications. Conducted and assisted with re-certification and continuing education. Provide CPR, AED, and First Aid training for in-house personnel and the public.

Sergeant, Medical, Supply, 5th BTN 19thSFG(A)Colorado Army National Guard
Responsible for distribution of supplies including uniforms, weapons, and daily equipment. Participate in security and access control for the unit area. Assisted as a medic in areas of forward operation for the sick and or injured. Volunteered, functioned as a spotter for a counter-sniper team.

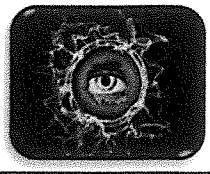
Emergency Medical Technician, American Medical Response, Denver Colorado.
Respond to emergency medical and trauma-related calls for service, including motor vehicle accidents, domestic violence, and medical problems. I was assigned as a Field Training Officer for Emergency Medical Technicians. I worked as an Emergency Dispatcher receiving phone calls and dispatching ambulances. I Provided CPR training for recertification. I have provided public CPR training every quarter to local residence.

EXPERT TESTIMONY:

- Federal Emergency Management Agency, National Fire Academy, at the National Emergency Training Center in Emmitsburg, Maryland. March 28 – April 8, 2011 Courtroom testimony R-208.

PROFESSIONAL ACTIVITIES:

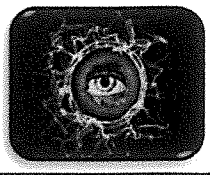
- Chairman of the Ethical Practices and Grievances Committee of the IAAI 2017-Present



- Member of the Ethical Practices and Grievances Committee of the IAAI 2015-2017
- President Colorado Chapter, International Association of Arson Investigators 2017 – Present
- 1st Vice President Colorado Chapter, International Association of Arson Investigators 2013-2016

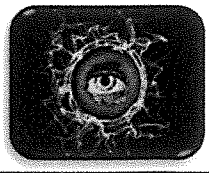
TEACHING EXPERIENCE

- Colorado Chapter International Association of Arson Investigators, Topic of the presentation was "Fatal Fire Investigation, Fire and Human Behavior, Arson Case Studies" Rifle CO, April 29, 30, 2021.
- Northwest Kansas Technical College, Topics I developed and presented on "Forensic Fire Scene Photography, Fire and Human Behavior, Arson Case Studies" Goodland KS, February 2021
- International Code Council (ICC), topic I developed and presented was on "Fatal Fire Investigations" Loveland CO, March 2020
- Northwest Kansas Technical College, Topics I developed and presented on "Fatal Fire Investigation, Fire and Human Behavior, Arson Case Studies" Goodland KS, February 2020
- Metropolitan State University Denver, Topic I developed and presented was on "Fire and Human Behavior" Denver CO, February 2020
- New South Wales (NSW) Australia, Association of Fire Investigators Where I presented topics involving "Fire and Human Behavior" In Sydney, Australia December of 2019.
- Fire Forensics Pty Ltd., New South Wales, Australia, I presented a series of topics "Post Flashover Fire Pattern Analysis, Myths and Legends of Fire Investigation, Negative Corpus, Interviewing and the Fire Investigation" Sydney Australia November of 2019.
- National Association of Subrogation Professionals. Webinar CO-presenter on "Arson Investigators Subrogation Webinar Series - Important Tips and Critical Issues Involved in Investigating and Handling Condominium and Townhome Losses" Englewood CO, June 2019.
- Northwest Kansas Technical College, Topics I developed and presented on "General presentation on overall fire investigation, Myths, and Legends of Fire Investigation, Fire and Human Behavior, Arson Case Studies" Goodland KS. February 2019
- Metropolitan State University Denver, Topic I presented was on, "Panel member for a testimony of student cases, provided instruction on follow up" Denver CO. December 2018
- Metropolitan State University Denver, Topic I developed and presented was on "Fire and Human Behavior" Englewood CO. September 2018
- Metropolitan State University Denver, Topic I presented was on "Hands-on Practical of Thermometry" Denver CO. 2018
- International Code Council (ICC), topic I developed and presented was on "Arson and Motives" Centennial CO. March 2018
- Colorado Chapter International Association of Arson Investigators,



Topic of the presentation was on "Basic fire investigation" Montrose CO. February 25-27, 2018

- Colorado Chapter International Association of Arson Investigators, Topic of the presentation was on "Basic fire investigation" Vail CO. October 25-27, 2017
- Advanced Engineering Investigations and Parker Care Homes (Part 2) Topic of the presentation was "Fire Safety Inspections and Fire Code Standards practical application" Arvada CO. November 2016
- Advanced Engineering Investigations and Parker Care Homes (Part 1) Topic of the presentation was "Fire Safety Inspections and Fire Code Standards" Arvada CO. November 2016
- Colorado Chapter International Association of Arson Investigators. The topic of the presentation was "Fire Cause and Determination, Fire Death, Scene Documentation" Vail CO. October 2016
- South Adams and Adams County Fire Departments, Topic of the presentation was on "Fire Cause and Determination, Scene Preservation, The Emergency Responder and the investigation" Commerce City CO. 2016
- South Adams and Adams County Fire Departments, Topic of the presentation was on "Update Origin and Cause Investigations new methods and reminders, myths and legends, use of burn cells" Commerce City CO. 2016
- Rocky Mountain Association of Special Investigative Units (RMASIU) - The topic of the presentation was "Background of Fire Investigative Technician for IAAI" Englewood CO. 2016
- South Adams and Adams County Fire Departments, Topic of the presentation was on "Residential Structure Fires, Vehicle Fires" Commerce City CO. March 2016
- South Adams and Adams County Fire Departments, Topic of the presentation was on "Fire Cause Determination, Orientation" Commerce City CO. 2016
- Colorado Chapter International Association of Arson Investigators. The topic of the presentation was "Basic fire investigation" Commerce City CO. May 25-27, 2016
- Advanced Engineering Investigations (AEI Corporation) Topic I developed and presented was "Structure vs. Wildland Fire Investigations, Interviewing, Subtypes of firesetters" Littleton CO. 2015
- International Code Council (ICC) Topic of the presentation was "Basic Fire Investigations, Arson, Negative Corpus, Fire Dynamics, Fire Behavior." Denver CO. 2015
- South Adams and Adams County Fire Departments, Topic of the presentation was on "Use and Application of the Ignition Matrix" Adams County CO. 2015
- South Adams County Fire Department, Topic of the presentation was on "New investigator training, Fire scene examination, Residential Structure Fires" Commerce City CO. 2015



- Advanced Engineering Investigations (AEI Corporation) Topic I developed and presented was - "Origin and Cause 101" Littleton CO. 2014
- Colorado Property Casualty Underwriters (CPCU). The topic I developed and presented was "Myths and Legends of Fire Investigation" Denver CO. 2014
- Rocky Mountain Association of Special Investigative Units. The topic I developed and presented was "Myths and Legends of Fire Investigation" Denver CO. 2014
- Feldman, Nagle Law Firm, Topic of the presentation was on "Introduction to Fire and Arson Investigation" Denver CO. 2014
- Hirst/Applegate Law Firm, Topic of the presentation was "Fire investigation 101" Cheyenne WY. 2014
- CSAA Insurance Group, Colorado Springs. The topic of the presentation was "Fire/Arson Investigation" Colorado Springs, CO. 2014
- North Washington Fire Protection District Fire Academy. The topic of the presentation was "Fire Cause Determination, Fire Behavior" Denver CO. 2013
- Rocky Mountain Association of Special Investigative Units. The topic I developed and presented was "Arson and the use of Negative Corpus" Englewood CO. 2013
- Advanced Engineering Investigations (AEI Corporation) Topic I developed and presented was "Myths and legends of fire Investigation" Littleton CO. 2013
- Colorado Chapter International Association of Arson Investigators. The topic I developed and presented was "Arson and the use of Negative Corpus" Vail CO. 2013
- North Washington Fire Protection District Fire Academy. The topic of the presentation was "Fire Behavior, Fire Dynamics" Denver CO. 2013
- North Washington Fire Protection District Fire Academy. The topic of the presentation was "Fire Cause and Determination, Fire Dynamics" Denver CO 2013
- North Washington Fire Protection District Fire Academy. The topic of the presentation was "Fire Behavior, Fire Dynamics, Loss Control" Denver CO. 2013
- Colorado Chapter International Association of Arson Investigators Topic of the presentation was "Effects of Ventilation and Determining post flashover fire patterns, Myths, and legends of Fire Investigation" Vail CO. 2013
- Rocky Mountain Association Special Investigative Units (RMASIU) Topic of the presentation was "Scientific Method / Negative Corpus" Centennial CO. 2013
- North Washington Fire Protection District, Fire Academy, Topic of the presentation was on "Fire Cause Determination, Fire Behavior" Denver CO. 2012

- North Washington Fire Protection District, Fire Academy, Topic of the presentation was on "Fire Behavior, Fire Dynamics" Denver CO. 2011
- North Washington Fire Protection District, Fire Academy, Topic of the presentation was on "Fire Cause and Determination, Fire Dynamics" Denver CO. 2011
- North Washington Fire Protection District, Fire Academy. The topic of the presentation was "Fire Cause and Determination, Fire Control" Denver CO. 2010
- North Washington Fire Protection District, Department-wide three-day course. The topic of the presentation was "Fire Scene analysis, Fire Cause and Determination, Fire Dynamics" Denver CO. 2010
- North Washington Fire Protection District, Fire Academy (second academy). The topic of the presentation was "Fire Behavior, Fire Dynamics" Denver CO. 2010
- North Washington Fire Protection District, Fire Academy. The topic of the presentation was "Fire Cause Determination" Denver CO. 2008
- North Washington Fire Protection District Fire Academy. The topic of the presentation was "Fire Control," Denver CO. 2007
- North Washington Fire Protection District, Fire Academy. The topic of the presentation was "Fire Cause and Determination, Fire Behavior" Denver CO. 2006

PUBLICATIONS / CONTRIBUTIONS:

- International Symposium on Fire Investigation (ISFI) Science and Technology/ Ignition Propensity of Cannabis (marijuana) Cigarettes (Co-Authored)
- AEI Corporation - Advanced Thinking Article / 'Drop and Give Me 20' Use of Negative Corpus Methodology
- AEI Corporation - Advanced Thinking Article / 'Arm Yourself with Evidence' Types of Evidence and Importance'
- AEI Corporation - Advanced Thinking Article / 'Walking on the Wild Side' Overview of Wild Land Fire Investigation'
- AEI Corporation - Advanced Thinking Article / 'What is the Standard of Care'

HONORS AND AWARDS:

- Eagle Scout
- American Red Cross Life Saving Award of Merit, Citation for Lifesaving
- Non-Commissioned Officer of the Quarter, 3rd Quarter 2015, 710th Security Forces Squadron, 310th Space Wing, Buckley Air Force Base, Aurora Colorado
- Officer of the Quarter, Castle Pines Emergency Services
- Airforce Commendation Medal
- (4) Navy & Marine Corps Achievement Medal
- Army Achievement Medal
- Iraq Campaign medal w/ Bronze star w/EGA

Appendix C – Schedule of Fees

The following is the standard Schedule of Fees for IRIS Fire Investigations, Inc. The hourly billing rates include all costs and mark-ups for hourly contracts except reimbursable expenses such as travel and special consultants. These billing rates are negotiable upon request and prior to engagement of IRIS Fire Investigations.

Chief Investigator[15]	$225.00/hr.
Certified Investigators[16]	$185.00/hr.
Additional Investigators for fire scenes[17]	$125.00/hr./per investigator
Case Review[18]	$250.00/hr.
Testimony[19] - 4 hr. minimum	$300.00/hr.
Travel Time[20]	Investigator's Hourly Rate
Mileage Charge	Current allowable IRS Rate
Long Distance Auto Travel > 4 hours one-way[21]	See footnote
Air Travel/Flight Time[22]	Investigator's Hourly Rate
Forensic Engineering Services	Cost
In-House Training	$1250.00 / day + expenses
Small Item Storage	$40.00 / month billed quarterly
Medium Item Storage	$60.00 / month billed quarterly
Large Item Storage	$80.00 / month billed quarterly

Reimbursable expenses include, but are not limited to, airfare, lodging, per diem, reproduction of documents, photographs, delivery service, and long-distance calling, and are billed at cost. Mileage will be charged at the standard rate designated by the Internal Revenue Service. Special or outside consultants are billed at cost plus 15%.

---

[15] Robert K. Toth, IAAI-CFI®

[16] Jim Berkley, Todd Hedglin, Jeff Johnson, Chris Wilder, Tom Aurnhammer

[17] If the fire scene requires additional investigators such as a wildfire, or based on size of loss, and scope of assignment, certified and accredited investigators will be utilized to ensure safety, enhance productivity and ultimately reduce time and expenses.

[18] Review and analysis by IRIS investigators, of investigations conducted by other subject matter experts, to assist in preparation for trial

[19] Testimony encompasses arbitration support, deposition, expert reports, all trial activities, preparation, and litigation services.

[20] As determined by a Google Maps time and distance calculation from IRIS offices to fire scene.

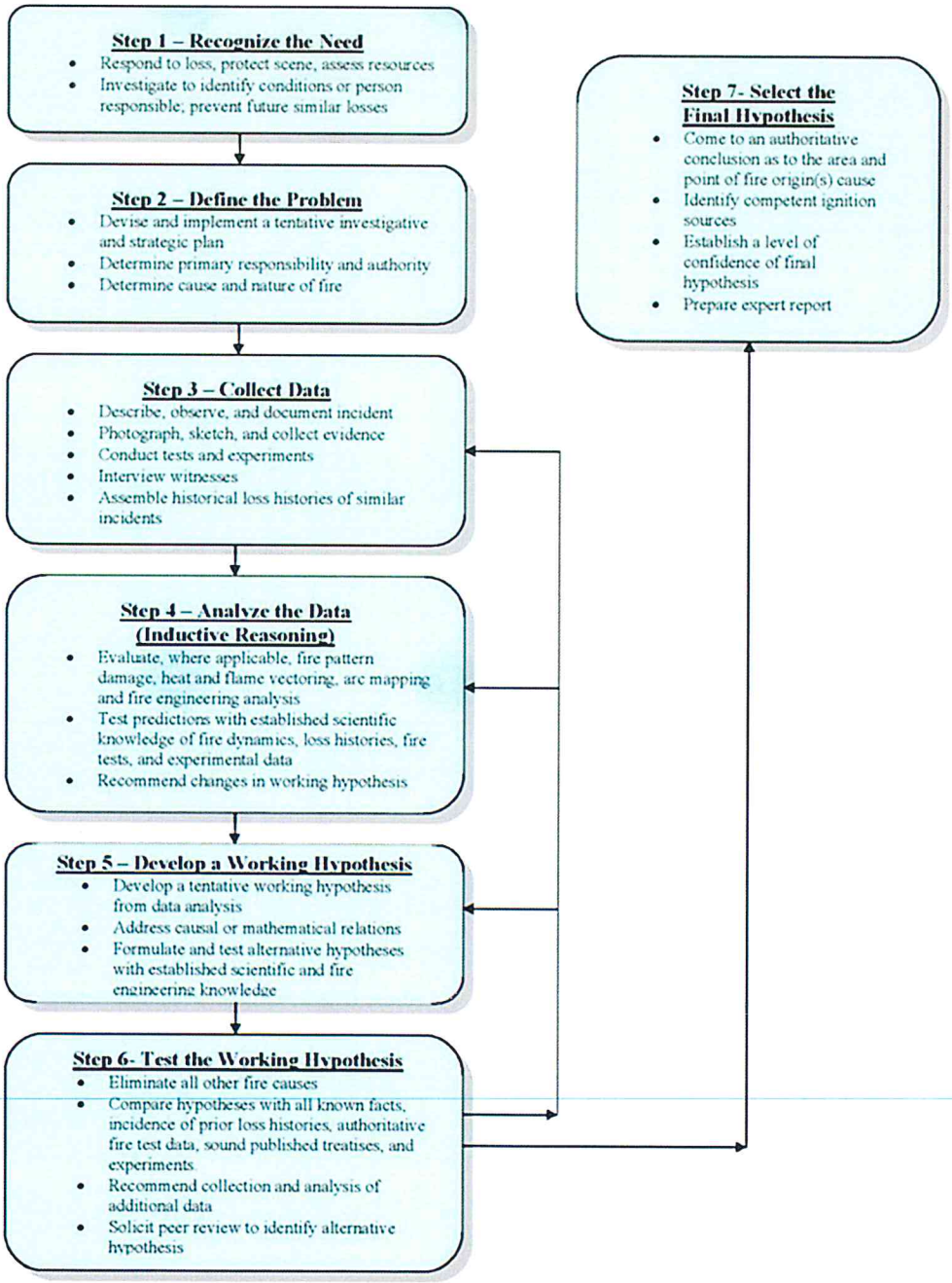
[21] IRIS Fire Investigations policy of "No More Than Four" is an effort to keep your costs down. IRIS Fire Investigations will not charge more than the cost of 4 hours of travel time each way (plus mileage) to any fire scene.

[22] Includes travel to and from the airport, plus scheduled flight time.

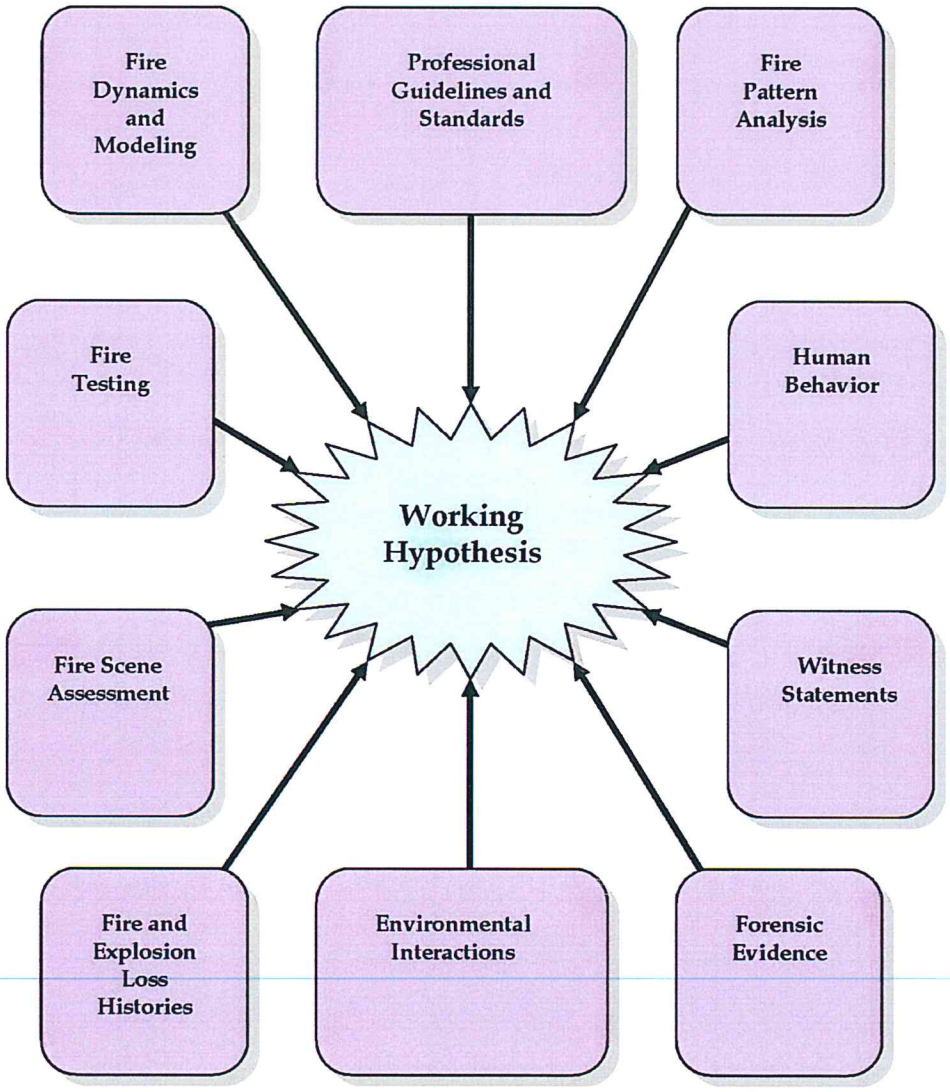
Created on April 15, 2021

A minimum retainer fee of $3000.00, and signed retention agreement, may be required prior to any investigative work conducted.

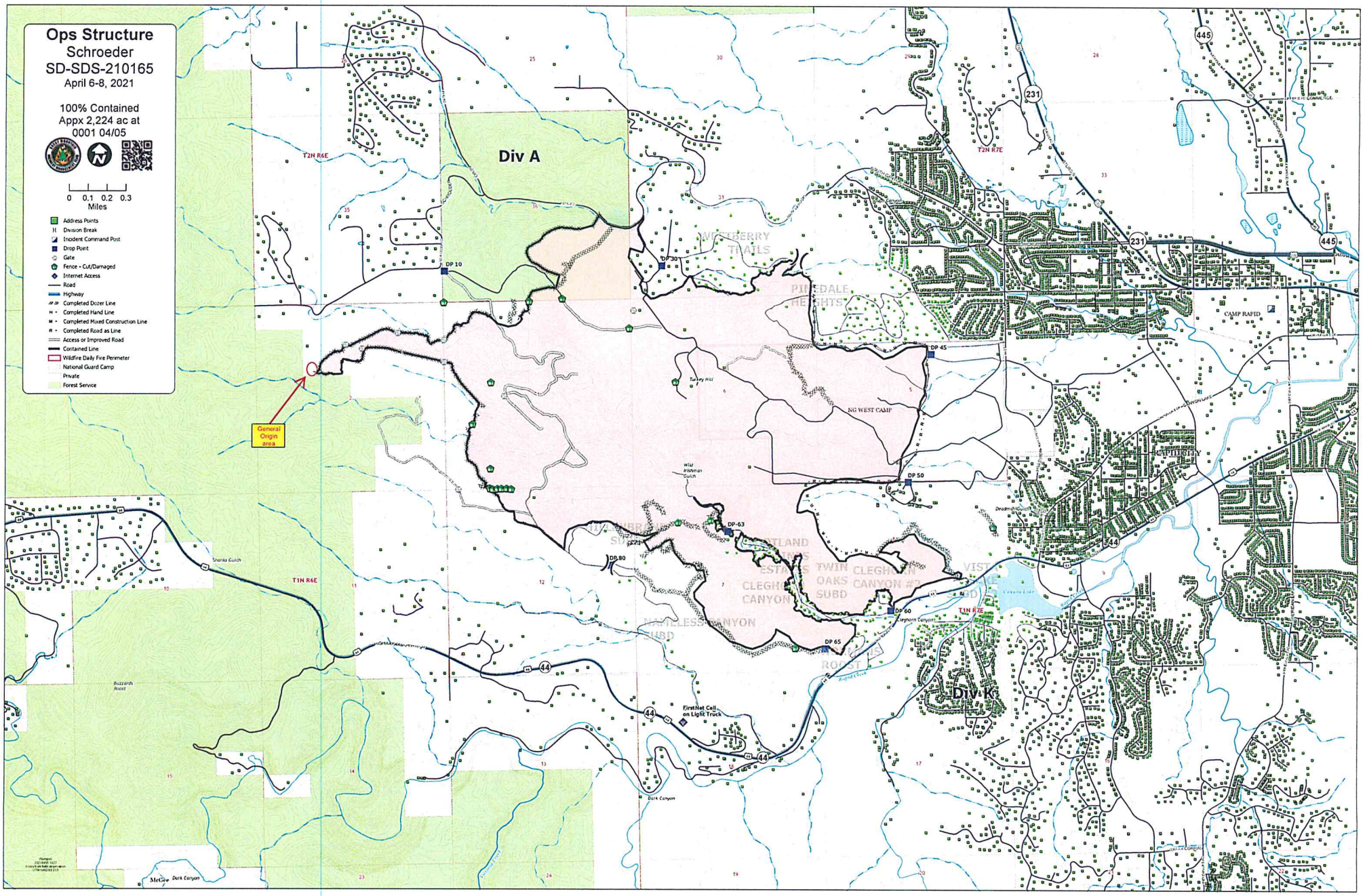
Appendix D – Scientific Method for Fire Investigations

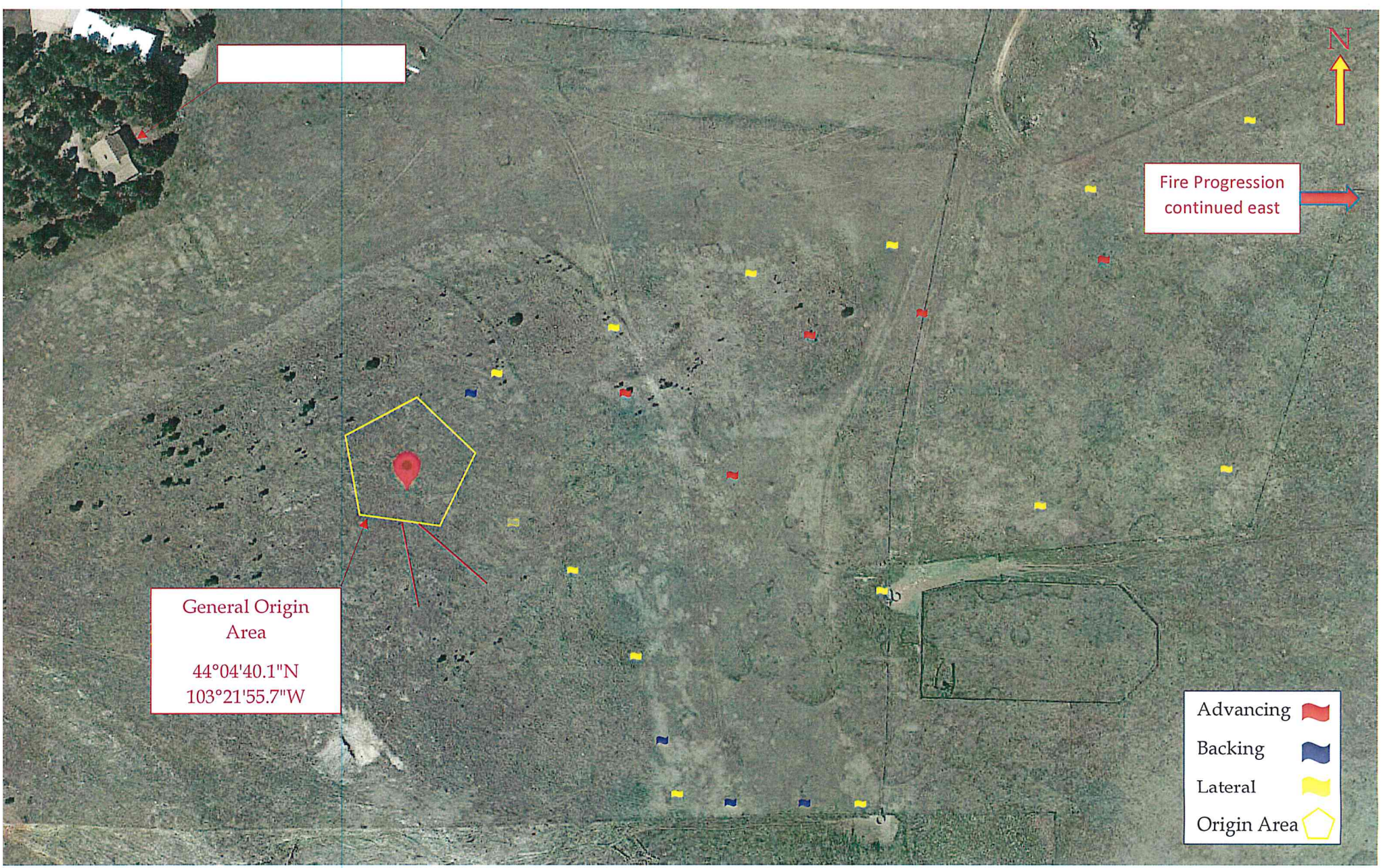


Appendix E – Source of Information



Sources of information that may contribute to a working hypothesis. *Courtesy of D.J. Icove.*


Ops Structure
Schroeder
SD-SDS-210165
April 6-8, 2021
100% Contained
Appx 2,224 ac at
0001 04/05
0 0.1 0.2 0.3
Miles
Address Points
Division Break
Incident Command Post
Drop Point
Gate
Fence - Cut/Damaged
Internet Access
Road
Highway
Completed Dozer Line
Completed Hand Line
Completed Mixed Construction Line
Completed Road as Line
Access or Improved Road
Contained Line
Wildfire Daily Fire Perimeter
National Guard Camp
Private
Forest Service
General Origin area
Div A
Div K
DP 10
DP 30
DP 45
DP 50
DP 60
DP 63
DP 65
DP 80
T2N R6E
T2N R7E
T1N R6E
T1N R7E
231
445
44
CAMP RAPID
NG WEST CAMP
Turkey Hill
Snanks Gulch
Buzzards Roost
Dark Canyon
FirstNet Cell on Light Truck


N
Fire Progression continued east
General Origin Area
44°04'40.1"N
103°21'55.7"W
Advancing
Backing
Lateral
Origin Area

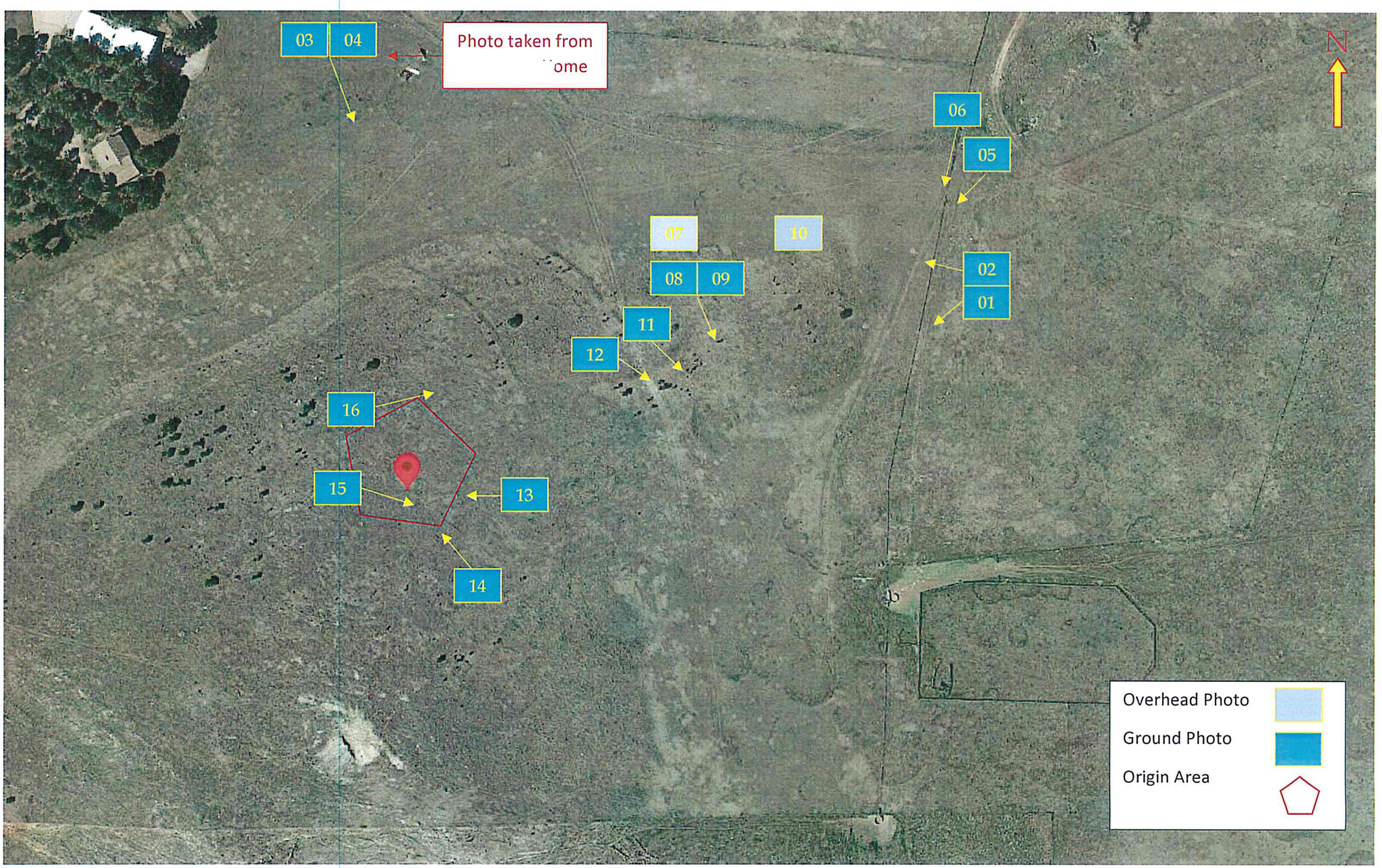

03
04
Photo taken from
ome
N
06
05
07
10
02
08
09
01
11
12
16
15
13
14
Overhead Photo
Ground Photo
Origin Area

Image 001: The Schroeder fire originated on a hilltop southeast of Looking to the west, the fire moved east influenced by wind and topography.

Image 002: The fire burn initially spread east, then north to Canyon Road and south to US Hwy. 44 and continued east on private and public lands in grass, brush, timber, and down timber.

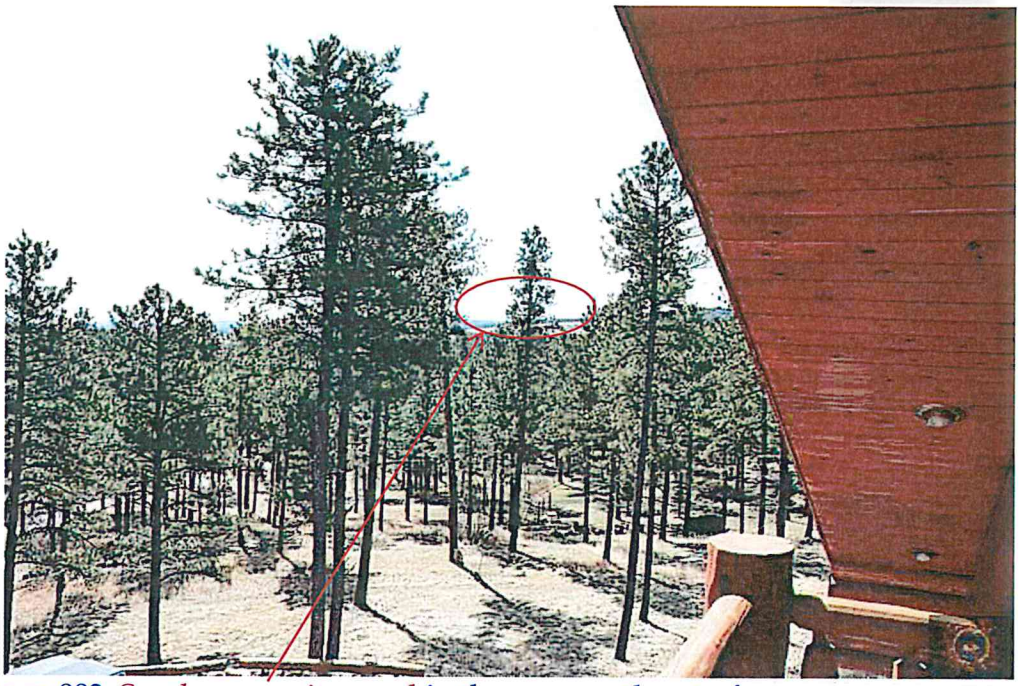


Image 003: Smoke was witnessed in the area southeast of
The fire was discovered almost immediately by a resident. (looking from Mr.
; second level window)

Image 004: ı (witness) described looking from his bedroom window, seeing smóke southeast of his home.

Image 005: The observed patterns were assessed and consistent with fire moving from west to east in the fire development's early stages.

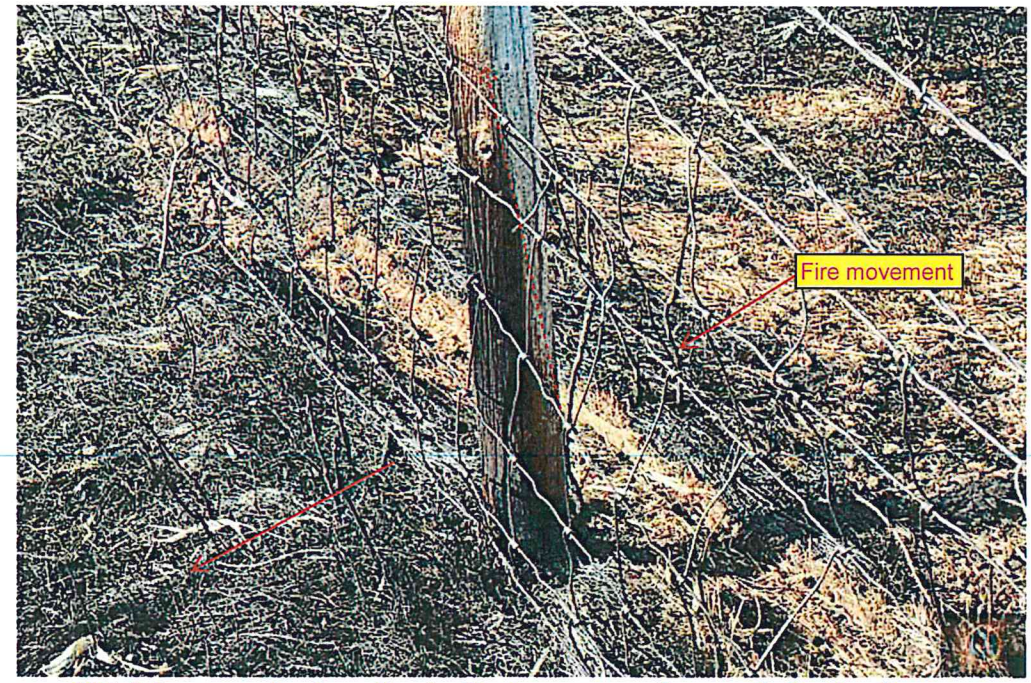


Image 006: Macro and micro fire indicators were observed, As the fire developed, indicators showed fire advancing from the general origin area and spread east down the hill.

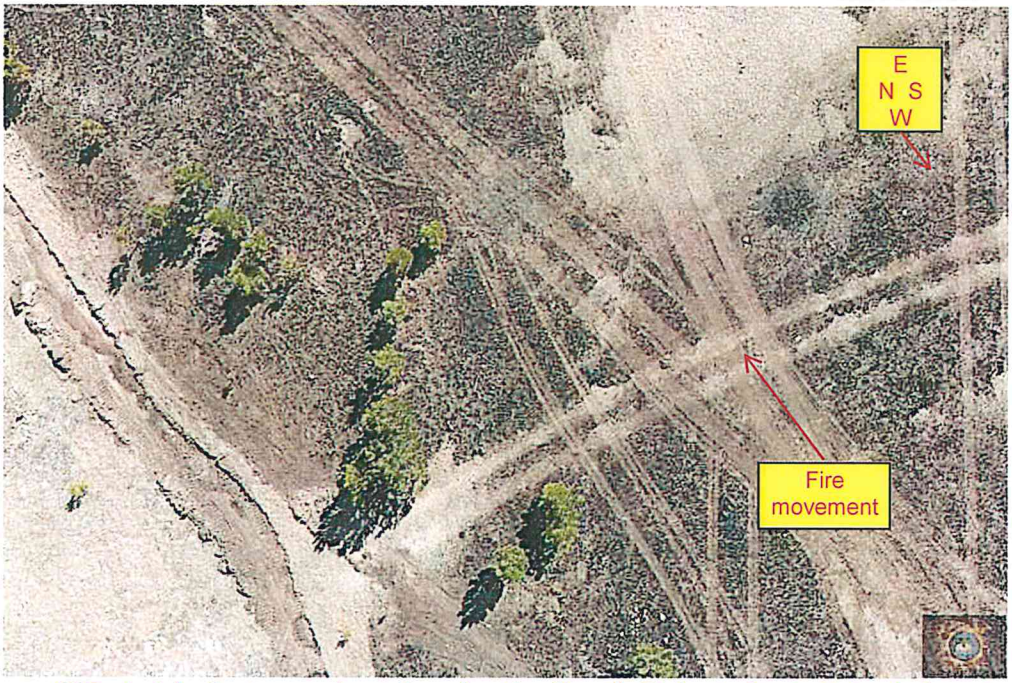


Image 007: Ariel photography taken by the South Dakota State Patrol showing burn areas down the hill, east of the general origin area.

Image 008: Observation of fire patterns from the ground, support and display fire originating from the west and moving east.

Image 009: Additional fire indicators were observed displaying angles of char on trees and brush, foliage on trees and bushes.

Image 010: Ariel photography taken by the South Dakota State Patrol showing burn areas down the hill to the east.

Image 011: Further observations displaying angles of char on trees, rocks and dry vegetation continued to support fire moving from the west to the east.

Image 012: Patterns on the rock display fire movement in the photo from right to left (west to east) showing burning, sooting and heat staining, and unburned fuel on the left (east) side of the rock.

Image 013: Looking west, at the edge of the general origin area, it displays a partially burned tree stump and continues to overlook what remained of the origin site.

Image 014: While law enforcement investigators were on scene, a section of dry dry fuel bed south east of the origin area ignited, likely as a result of an ember landing in the dry vegetation.

Image 015: Looking east from the general origin area, the vicinity was flagged with yellow scene tape in an effort to secure and identify the area.

Image 016: Looking east, the Schroeder continued to burn east involving 2224 acres, one residential and seven additional structures.

CoreLogic

Weather Verification Services

STRIKEnet® Report

Claim or Reference #	SD Wildfire
Insured/Property Owner	State of SD
STRIKEnet Report #	18191227
Coordinates	Latitude 44.0778028, Longitude -103.3654694
Search Period	Sun, Mar 28, 2021 00:00 US MDT to Tue, Mar 30, 2021 23:59 US MDT
Search Radius	3 mi (5 km)
Report Generated	Apr 12, 2021 at 20:43:09 GMT

Summary

STRIKEnet verified there were ZERO cloud-to-ground lightning strokes detected within 3 miles of the property for the dates inquired.

Thank you for using STRIKEnet to validate lightning. Your report was generated by CoreLogic using data from Vaisala's National Lightning Detection Network® (NLDN), the most comprehensive lightning strike archive database in North America.

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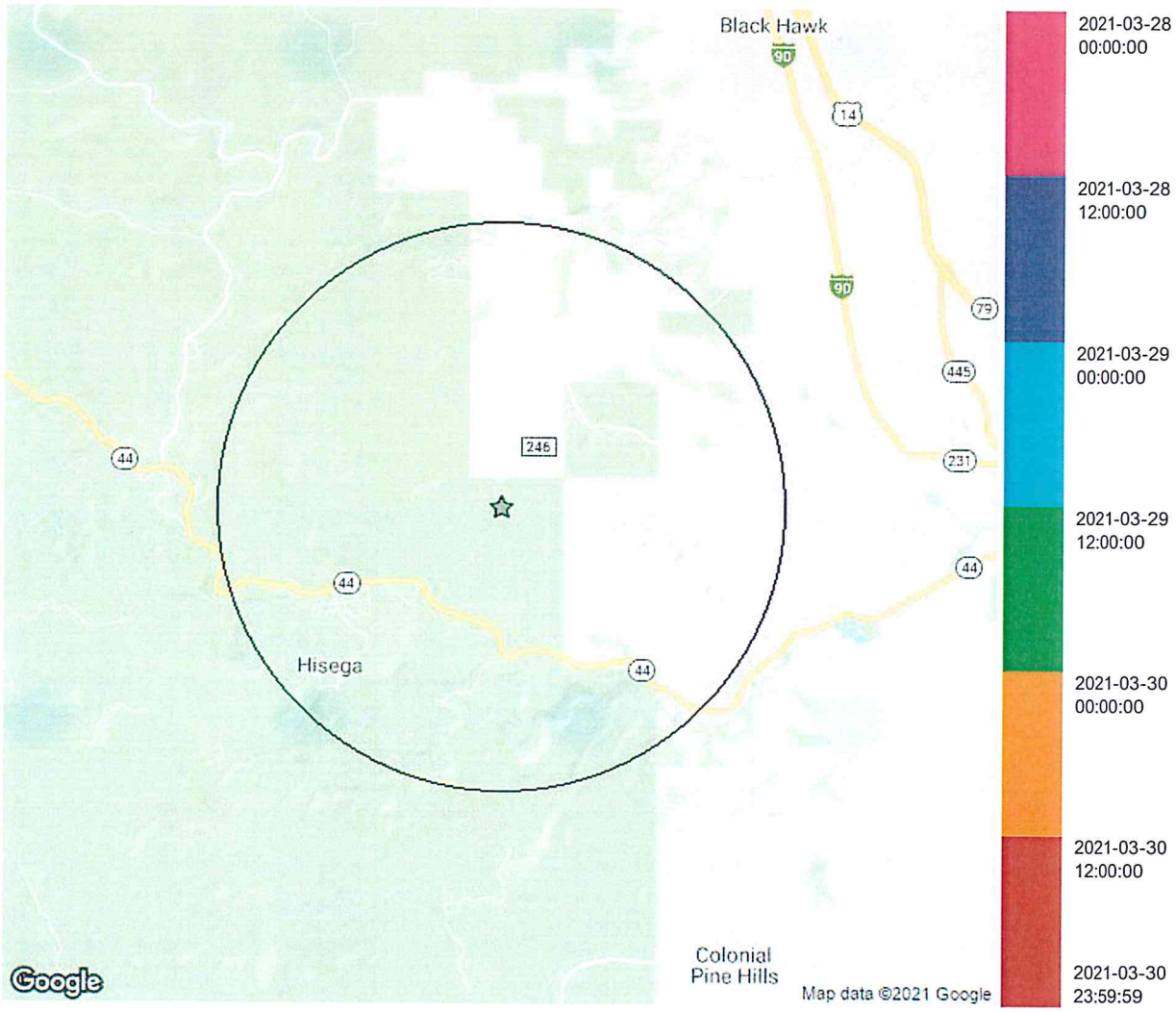
Lightning Stroke Map



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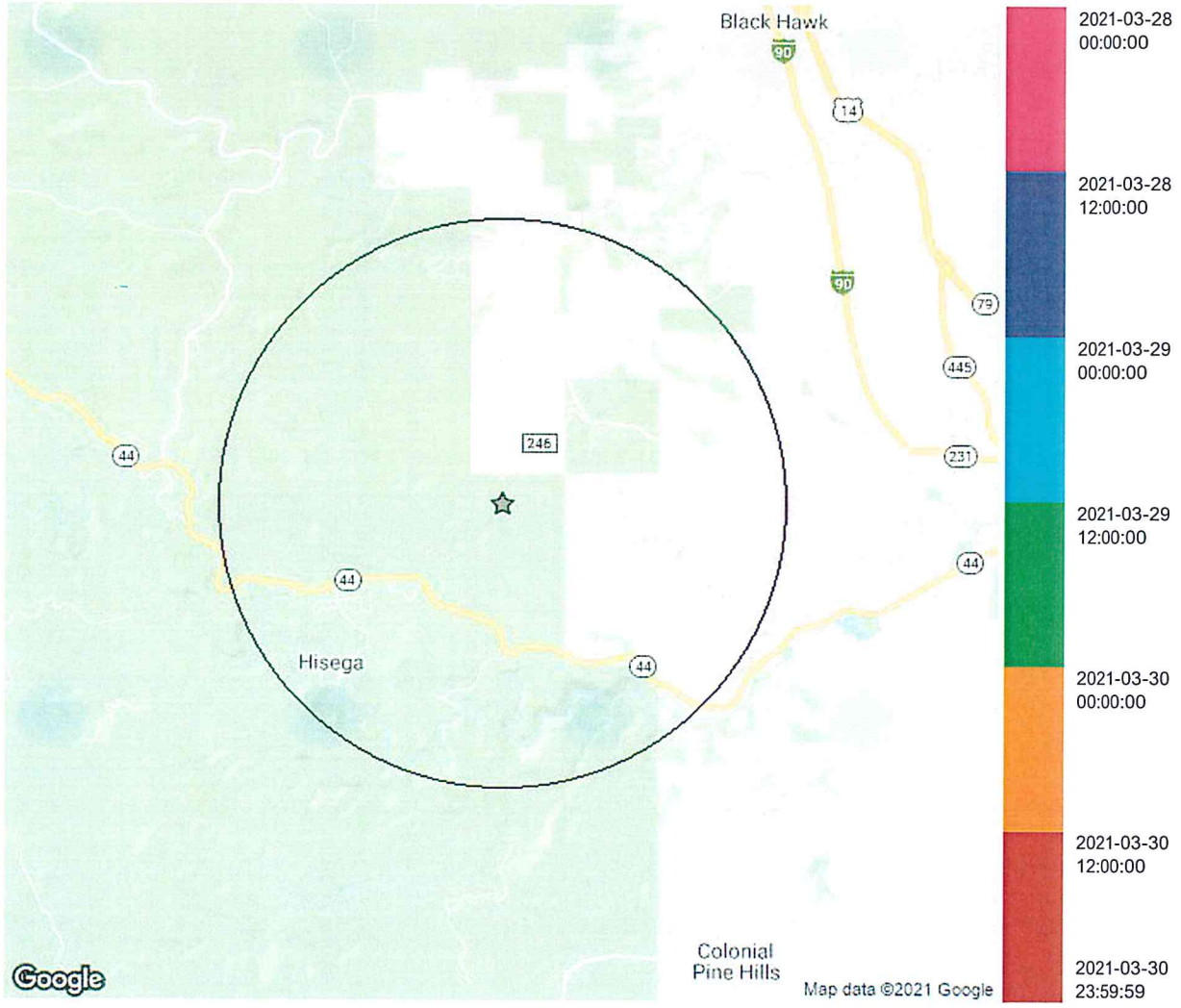
Confidence Ellipses For Lightning Strokes



Lightning Confidence Ellipse Map indicates with 99% certainty that the recorded lightning event contacted the ground within the bounds of the ellipse.

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Key Results

Lightning Strokes Detected within 3 mi (5 km)	0

Number of Strokes Detected by Time Period

Period	# of Strokes
Sun, Mar 28, 2021 00:00 US MDT to Sun, Mar 28, 2021 12:00 US MDT	0
Sun, Mar 28, 2021 12:00 US MDT to Mon, Mar 29, 2021 00:00 US MDT	0
Mon, Mar 29, 2021 00:00 US MDT to Mon, Mar 29, 2021 12:00 US MDT	0
Mon, Mar 29, 2021 12:00 US MDT to Tue, Mar 30, 2021 00:00 US MDT	0
Tue, Mar 30, 2021 00:00 US MDT to Tue, Mar 30, 2021 12:00 US MDT	0
Tue, Mar 30, 2021 12:00 US MDT to Tue, Mar 30, 2021 23:59 US MDT	0

Lightning Strokes

Date	Time (MDT)	Peak Current (N/A)	Distance from Center (mi/km)	Latitude	Longitude
No lightning detected within requested parameters.					

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About STRIKEnet®

Unlike other lightning verification methodologies, The STRIKEnet Report uses 25-plus years of lightning data acquired from the U.S. National Lightning Detection Network® (NLDN) and the Canadian Lightning Detection Network (CLDN). First introduced by Vaisala, Inc. in 1989 and later enhanced by the 2014 CoreLogic acquisition of Weather Fusion—a value-added reseller of Vaisala's STRIKEnet® Report—the lightning verification data that powers the STRIKEnet Reports is industry-recognized as the standard for accuracy based on thousands of peer-reviewed citations.

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