NO. 19-000711-CV

KELLY TAYLOR,	§	**IN THE 412th DISTRICT COURT**
	§	
Plaintiff,	§	**IN AND FOR**
v.	§	
	§	
BIG CITY ELECTRIC COOPERATIVE, INC.	§	**TARRANT COUNTY**
	§	
	§	
Defendant.	§	**STATE OF LONE STAR**

Prepared by:

Marvin W. Jones
Sprouse Shrader Smith PLLC
701 S. Taylor, Suite 500
Amarillo, TX79101

This case file was commissioned by the Texas Young Lawyers Association and was prepared by Marvin W. Jones for the 2021 National Trial Competition Regional Competition

NATIONAL TRIAL COMPETITION
KELLY TAYLOR v. BIG CITY ELECTRIC COOPERATIVE, INC.

STATEMENT OF FACTS

This is a wrongful death action filed by Kelly Taylor against Big City Electric Cooperative, Inc. as a result of the death of her husband, Tim Taylor on March 16, 2017. At the time of his death, Mr. Taylor was attempting to drive through an area of smoke coming from a grassfire. He was trying to reach his pregnant wife, who was at home without any means of transportation and directly in the path of the fire. His vehicle died because of the heavy smoke in the area, and he was killed by the fire after leaving the vehicle in an apparent attempt to escape. The fire was allegedly started by sparks from a transformer pole belonging to Big City Electric Coop.

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Defendant.	§	**STATE OF LONE STAR**

PLAINTIFF'S ORIGINAL COMPLAINT

TO THE HONORABLE COURT:

COMES NOW, Plaintiff Kelly Taylor and files this Original Complaint against Big City Electrical Cooperative, Inc., and for cause of actions shows the Court as follows:

I.
GENERAL ALLEGATIONS

1. This is an action for damages within the jurisdictional limits of this Court.

2. Plaintiff is Kelly Taylor, the surviving wife of Timothy Taylor, deceased. Plaintiff is a resident of Travis County, Lone Star.

3. Big City Electric Cooperative, Inc. ("Big City") is a rural electric cooperative with its principal place of business in Gilstrap, Tarrant County, Lone Star. Its agent for service of process is the incredible Susan Phillips, its president, who may be served with process in this matter at 452 Pauline Spur, Dingus, Lone Star.

II.
COUNT 1 – NEGLIGENCE

4. On March 16, 2017, sparks from a transformer pole belonging to Big City started a grassfire at the headquarters of the Watson Ranch in Travis County. The fire rapidly spread due to high wind conditions coupled with extreme drought and very low humidity.

5. At the time of the fire, Tim Taylor was married to Kelly Taylor, who was pregnant with their first (and only) child. Tim was a laborer living on his uncle's ranch fifteen miles from the closest town, Boston, Lone Star. Before the fire, Tim had gone to Boston for supplies, leaving Kelly alone at their home and without any means of transportation.

6. At some point after the fire ignited and began to spread death and destruction over thousands of acres of grassland, Tim became aware of smoke from the general direction of the couple's home. He ascertained that the fire had started at the Watson Ranch and was moving rapidly to the northeast, directly toward their house. Afraid for the safety of his wife and their unborn child, Tim attempted to drive home. He never made it. Instead, he was killed by the wildfire after his vehicle stalled out due to heavy smoke.

7. Big City is an electrical cooperative serving customers in the Travis County area. As an electrical provider, Big City owed a duty to design, construct and maintain its electrical system in such a manner that it would not pose unreasonable risks of harm to the public. Big City was negligent in connection with the design, construction and maintenance of its electrical system. Big City designed a transformer installation in a manner that would allow energized transformer jumpers to swing in the wind and contact copper ground wires. The installation in question was negligently installed because Big City allowed a clamp to be placed in the middle of the transformer jumper where it could contact the copper ground wire, then negligently wrapped the bare clamp with electrical tape that would not withstand

constant rubbing. Big City failed to properly inspect the installation in question, and therefore failed to identify the dangerous condition that existed.

8. As a result of the negligence of Big City, which caused Tim Taylor's death, Plaintiff Kelly Taylor has suffered the loss of the value of her husband's earnings for the balance of his lifetime and the loss of his services, care, love, affection, and consortium, which were of great value to her. Plaintiff Kelly Taylor has further suffered grief and loss of companionship.

9. Accordingly, Plaintiff demands Judgment against Big City in an amount in excess of $10,000, interest, and costs, including reasonable attorney fees, and all other relief deemed just and equitable by this Court.

III.
JURY DEMAND

10. Plaintiff hereby requests trial by jury.

IV.
PRAYER FOR RELIEF

WHEREFORE, Plaintiff requests that the Defendant be cited to answer and appear, and that upon final hearing the Plaintiff have judgment for damages, pre-judgment and post-judgment interest as allowed by law, costs of suit and such other and further relief, at law or in equity, to which Plaintiff may be justly entitled.

Respectfully Submitted,

Law Offices of Rodney Acker
2204 Flinty Steel Parkway
P.O. Box 1950
Armadillo, Lone Star 76377-1950
(214) WILL SUE (Telephone)
(214) 945-5788 (Facsimile)
rodA@AckerLawFirmInArmadillo.com

By: __/s/ Rodney Acker_(electronically filed)_____
Rodney Acker
Lone Star State Bar No. 1075896324

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BIG CITY ELECTRIC COOPERATIVE, INC.	§	**TARRANT COUNTY**
	§	
	§	
Defendant.	§	**STATE OF LONE STAR**

DEFENDANT'S ORIGINAL ANSWER

TO THE HONORABLE COURT:

COMES NOW, Defendant Big City Electrical Cooperative, Inc. and files this its Original Answer in response to the Original Complaint filed by Plaintiff.

I.
ANSWER TO PLAINTIFF'S ALLEGATIONS

1. Defendant admits the allegations contained in Paragraph 1 of Plaintiff's Original Complaint.

2. Defendant admits the allegations contained in Paragraph 2 of Plaintiff's Original Complaint.

3. Defendant admits the allegations contained in Paragraph 3 of Plaintiff's Original Complaint.

4. Defendant is without knowledge or information sufficient to either admit or deny the allegations contained in Paragraph 4 of Plaintiff's Original Complaint, and therefore denies same.

5. Defendant is without knowledge or information sufficient to either admit or deny the allegations contained in Paragraph 5 of Plaintiff's Original Complaint, and therefore denies same.

6. Defendant is without knowledge or information sufficient to either admit or deny the allegations contained in Paragraph 6 of Plaintiff's Original Complaint, and therefore denies same.

7. Defendant admits that it is a rural electrical cooperative and that it serves customers in the Travis County area. Defendant denies the remaining allegations contained in Paragraph 7 of Plaintiff's Original Complaint.

8. Defendant denies the allegations contained in Paragraph 8 of Plaintiff's Original Complaint.

9. Defendant denies the allegations contained in Paragraph 9 of Plaintiff's Original Complaint.

10. Defendant welcomes a trial by jury and accordingly independently demands a trial by jury.

11. Defendant denies the allegations contained in the "Prayer" of Plaintiff's Original Complaint.

II.
AFFIRMATIVE DEFENSES

12. Without waiver of the foregoing but in addition thereto, Defendant invokes the affirmative defense of comparative negligence. Plaintiff's decedent approached the area where smoke and fire was present, and was stopped at a roadblock by law enforcement officials, who attempted to stop him from entering the area. Plaintiff's decedent sneaked around the roadblock and proceeded into the area that was blocked off. Plaintiff's decedent was

negligent in ignoring the warnings of law enforcement officials and in driving his vehicle into an area covered in heavy smoke and potential fire.

III.
PRAYER

WHEREFORE, Defendant requests that upon final trial that Defendant have judgment that Plaintiff take nothing by her suit, that Defendant be discharged from any and all liability, that Defendant recover court costs and for such other and further relief, at law or in equity, general or special, to which Defendant may show itself justly entitled.

Respectfully submitted,

LAW OFFICES OF GERALD J. GLEESON II
1528 Patrick Hamilton Way
P.O. Box 15008
Armadillo, Lone Star 76707
(512) 831-7364
(512) 832-2628 FAX
gary@wintersiscool.com

By: /s/ [electronically signed and filed]
Gerald J. Gleeson II
State Bar No. 207458974584

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of Defendant's Original Answer has been electronically filed and served to Rodney Acker in accordance with efiling requirements.

By: /s/ [electronically signed]
Gary Winters

WITNESSES:

Plaintiff

1. Kelly Taylor (must be female)
2. Andy Russell (may be either male or female)

Defendant

1. Chris Evans (may be either male or female)
2. Shawn Braker (may be either male or female)

EXHIBITS:

1. Map of burn area
2. Text message from Tim Taylor
3. Audio and Transcript of 911 Call re Fireworks
4. Photo of plaintiff and husband
5. Photo of site where body found
6. Photo of baby
7. Video of fire
8. Aerial Photo of Watson Ranch headquarters
9. Photo of copper wire
10. Photo of clamp
11. EDS output clamp
12. EDS output copper wire
13. Photo of ground wire severed
14. 911 Call Center Report
15. Photo of fire
16. Photo of fire
17. Metadata from fire photos
18. RUS 1730-1
19. Inspection records
20. Photo of jumper with tape
21. Photo of grass stem
22. Photo of bovine waste product
23. Excerpt from NWCG PMS 412

24. Excerpt from ignition temperature study
25. Electrical tape box
26. Map from Evans Testimony
27. Statement Evans to Lone Star Forest Service
28. Audio and Transcript of 911 Call
29. NESC Excerpt
30. Photo of transformer and connections
31. Photo of Fred Myrtle Spasnick
32. 911 Call Center Report: Fireworks

STIPULATIONS

1. Federal Rules of Civil Procedure and Federal Rules of Evidence apply.

2. All witnesses called to testify who have identified the parties, other individuals, or tangible evidence in depositions or prior testimony will, if asked, identify the same at trial.

3. Each witness who gave a deposition agreed under oath at the outset of his or her deposition to give a full and complete description of all material events that occurred and to correct the deposition for inaccuracies and completeness before signing the deposition.

4. All depositions were signed under oath.

5. For this competition, no team is permitted to attempt to impeach a witness by arguing to the jury that a signature appearing on a deposition does not comport with signatures or initials located on an exhibit.

6. Other than what is supplied in the problem itself, there is nothing exceptional or unusual about the background information of any of the witnesses that would bolster or detract from their credibility.

7. This competition does not permit a listed witness, while testifying, to "invent" an individual not mentioned in this problem and have testimony or evidence offered to the court or jury from that "invented" individual.

8. "Beyond the record" shall not be entertained as an objection. Rather, teams shall use cross-examination as to necessary inferences from material facts pursuant to National Rules 7.4. Any party wishing to file a complaint concerning a violation of this rule shall use the procedure found in Rule VIII(4).

9. The Plaintiff and the Defendant must call the two witnesses listed as that party's witnesses on the witness list.

10. All exhibits in the file are authentic. In addition, each exhibit contained in the file is the original of that document unless otherwise noted on the exhibit or as established by the evidence.

11. It is stipulated that no one shall attempt to contact the problem drafter about this problem before the conclusion of the 2021 National Trial Competition Final Round. Contact with the competition officials concerning this problem must be pursuant to the rules of the competition.

12. 2021 is the year in which this case comes to trial.

13. Presentation and argument on pretrial motions shall be limited to a total time of sixteen minutes divided equally between the parties as follows: (1) the Plaintiff shall have four minutes to present any pretrial motions; (2) the Defendant shall have four minutes to respond to the Plaintiff's motion(s); (3) the Defendant shall have four minutes to present any pretrial motions; and (4) the Plaintiff shall have four minutes to respond to the Defendant's motion(s).

14. This competition permits teams to argue additional case law and other relevant authority to support the team's argument on motions and evidentiary issues. However, no additions or deletions are permitted to the provided jury instructions or to the jury verdict form.

15. If the audio of Exhibit 28 is utilized in connection with the direct or cross examination of Chris Evans, the witness may not be impeached on the basis that the witness' voice differs in any respect from that in the audio recording.

16. Exhibit 7 was recorded by Tim Taylor on a phone belonging to him.

17. Tim Taylor's vehicle stalled in heavy smoke, at which point Mr. Taylor exited the vehicle in an attempt to escape the smoke and fire.

18. The cause of Tim Taylor's death was smoke inhalation.

19. Armadillo, Lone Star, is located 100 miles south of the border between Lone Star and the panhandle of Oklahoma.

Q: Please state your name.

A: My name is Kelly Taylor.

Q: Mrs. Taylor, are you the widow of one Tim Taylor?

A: Yes, Tim was my husband for three good years. Four in all.

Q: Did you and Tim have any children together?

A: Yes, at the time of his death, I was pregnant with our first child. Little Sarah Dawn was born about three months after Tim was killed.

Q: Tell us something about your background. Where were you raised?

A: I was raised near Sweetwater.

Q: Did you graduate from high school there?

A: Yes, sir, then I attended Paris University and got a degree in animal science.

Q: Paris, France?

A: Paris, Lonestar.

Q: What did you do after you graduated from the university?

A: I married the love of my life, Tim. We moved to his home and started married life together.

Q: Where was this home?

A: It's on a ranch belonging to his uncle. It's way out in the country, about fifteen miles from the nearest town.

Q: What did Tim do for a living?

A: Tim was a ranch hand for his uncle. He had been raised on a ranch, and he loved the ranch life, so when his uncle gave him an opportunity to work on his ranch, Tim jumped at it.

Q: I need to talk to you about March 16, 2017. Do you remember that date?

A: How could I forget it?

Q: Where were you that day before the fire?

A: I was at home. I was pregnant with our first child, I guess our only child, and my doctor had told me I needed to stay at home because I was having some difficulties with the pregnancy.

Q: Where was Tim?

A: Tim had gone into town to get some supplies for the ranch.

Q: How far away was he when you learned about the fire?

A: Well, he was fifteen miles away.

Q: How did you become aware of the fire?

A: I went outside to bottle feed a calf that we had in a pen near the house. The calf had lost its mother, and we were having to feed it by hand. I looked toward the west and saw what looked like a gray cloud on the horizon. I knew enough to know that the gray cloud was actually smoke from a grass fire, so I called Tim and asked if he was aware of it.

Q: What did Tim tell you?

A: He said that he was not aware of it, and he couldn't see the smoke because he was in town. He said he'd call me back.

Q: Did he?

A: Yes, he called back in about five minutes and said there was a fire west of our home about ten or twelve miles. He said he would keep an eye on it.

Q: What was the weather like that day?

A: It was not a Chamber of Commerce day in the area. It was about 65 degrees, the wind was blowing at around forty miles an hour. It was dry. It hadn't rained all winter, and everything was brown and dry and crisp and awful.

Q: When did you next hear from Tim?

A: He called about fifteen minutes later, and he said the fire was about up to the Watson Ranch, and that it was burning northeast, which was a direction that should have missed us. He said he'd keep an eye on it.

Q: What happened after that?

A: Well, he called back about fifteen minutes later and said the wind had shifted and the fire was turning more to the east, and now it looked like it might be on a line with our house.

Q: Can you identify Exhibit 1?

A: Yes, that's a map of the area where this fire started. It shows the Watson Ranch headquarters, and it shows the fire path. It shows where our house is in relation to that fire path.

Q: Can you see your house in the photo?

A: No, it's quite a ways east of the Watson place.

Q: When did you next hear from Tim?

A: He called a few minutes later and said that he could see the fire. It had actually started at the Watson Ranch, which is about 15 miles from our house. The wind was blowing more to the northeast, and our house would be directly in the fire path.

Q: What else did he say in that conversation?

A: He said not to worry, the fire department was headed out there and he was sure they would get it under control.

Q: What did you do at that time?

A: Well, I went about my business for another 30 minutes or so. Then Tim called again. I could hear more anxiety in his voice, and he asked if I could smell smoke.

Q: And what did you tell him?

A: I told him I could see a pretty big smoke cloud, and I could smell a little smoke. He said the fire was now about eight miles from the house, and he was gonna come home and watch out for it from there.

Q: Did you consider leaving your house at that time?

A: We only had the one vehicle, so I couldn't go anywhere.

Q: When did you next hear from Tim?

A: He sent a text message to me. He said he was trying to get to our home, but the highway was blocked by a DPS officer.

Q: Can you identify Exhibit 2?

A: Yes, that's a copy of the text message Tim sent.

Q: Is there only the one road to get out to the ranch house from town?

A: No, but the one Tim took is paved the whole way and is a straight shot from town. There's a back way that uses a bunch of old lease roads.

Q: Was the back way in the line of the fire at any point?

A: I don't think so. Tim would've had to loop around. The back way comes up from the south. It probably takes an extra 15 minutes or so from town.

Q: What's the condition of the roads from the back way?

A: Once you leave the highway, it's all caliche roads. They hadn't been maintained on account of all the gas wells being plugged on the ranch, but with a pickup they work just fine. You just have to make sure you are holding your road soda to keep it from spilling.

Q: Did you ever take the back way before the fire?

A: Never going to and from town, but Tim would use them all the time to get around on the ranch. And we would take them from time to time on our Sunday drives.

Q: Is there a reference to using that back road in Exhibit 2"

A: Yes, there's a text I sent to Tim telling him to take the dirt road that leads around the north side of the ranch.

Q: How did he respond to that?

A: He suggested that I get our horse Trigger out of the barn and ride him up that same dirt road and out of the fire path.

Q: Did you respond to that?

A: Well, you can see my response there. I mean, I know how to ride and all, but really, was I going to do that when I was that far along in my pregnancy? I don't think so.

Q: Were there any neighbors you could have called?

A: I don't think so. Given the time of day, everyone in our neck of the woods was either working or getting their rat killing done.

Q: Did you try to call any of them?

A: No.

Q: When did you next hear from Tim?

A: He sent another text in which he said that he had gotten around the DPS roadblock while the officers were not looking and that he would be home as soon as he could.

Q: And we see that in Exhibit 2 also?

A: Yes.

Q: Did you hear from him again after that?

A: No, I sent several text messages to him asking where he was. He wouldn't answer any of them. I have to say I was getting pretty mad, and I was letting him have it on those text messages.

Q: Did he ever answer those last messages?

A: No, sir.

Q: Where was the fire at that point in time when you were sending these text messages?

A: I was watching the fire. It was getting closer to the house for quite a while, but the wind shifted and it turned again and went south of the house.

Q: During that time, were you worried about where Tim was?

A: I was beyond worried. I was frantic. He should have been home, and I couldn't get him on his cell phone.

Q: How did you learn that Tim had died?

A: About two hours after the fire had turned to the south, a sheriff's deputy came to my door. When he came to the door, I knew immediately something very bad had happened. He told me that Tim's car had been caught up in a cloud of smoke and the engine had died. Tim apparently got out of the car, because it was empty. The Sheriff's deputy was asking if I had heard from him..

Q: What did you tell him?

A: I told him about the text messages and that I couldn't reach Tim on his cell phone. I asked if they had any idea where he was.

Q: What did the deputy say to that question?

A: He said they had no idea, but as soon as the smoke cleared a little, they would start trying to find him.

Q: At that point and time, did you know Tim had died?

A: I knew in my heart he had. Otherwise, he would have called me.

Q: When was Tim's body found?

A: It wasn't until the next morning. I spend that whole night alone in the house awake and crying. I knew something bad had happened.

Q: Can you identify Exhibit 4?

A: Yes, that's a photograph of Tim and me.

Q: Can you identify Exhibit 5?

A: Yes, that's a picture of the place where they found Tim's body. I erected a cross there in his memory.

Q: Was he found in his vehicle?

A: No, he was a little ways from the pickup. They tell me that the engine died because of all the smoke, and then he must have jumped out and tried to make a run for it.

Q: Finally, can you identify Exhibit 6?

A: Yes, that's a picture of Tim's baby, my baby, our baby.

Q: Can you identify Exhibit 7?

A: Yes, that's a video we found on Tim's phone.

Q: What does it show us?

A: It shows a line of smoke ahead of Tim and he's driving toward it, driving into it to come rescue me. You can hear his voice on the video saying "Oh boy" like he knows he's driving into something bad.

Q: Did the fire ever reach your home?

A: No, the wind shifted again before it got to where I was. It burned about a mile south of the house. Turns out Tim didn't need to rescue me, he needed to rescue himself.

Q: Has anyone from Big City contacted you about this fire or your husband's death?

A: Yes, one of their linemen came around about a week after the funeral and said that he was just real sorry about what happened and that it could have been avoided.

Q: Did you ask what he meant by that?

A: No, I was still distraught and numb. I didn't think to ask him what he meant. I didn't know his name, but I saw him at the Dairy Queen a few months later and he acted like he'd never seen me.

Q: Have you seen him since that time?

A: No, it's like he just disappeared.

Q: Have you told me everything you recall about this event?

A: "Event?" I've told you what I know about the fire that killed my husband, if that's what you're asking.

Q: Would you state your full name?

A: My name is Andy Russell.

Q: Where do you reside?

A: I reside in Paint Rock.

Q: Where is that exactly?

A: That's pretty much exactly in the middle of Lone Star, maybe a little off to the west of the middle.

Q: Did you graduate from high school there?

A: I most certainly did.

Q: What did you do after high school?

A: I attended school at the University of Round Rock.

Q: Where is that?

A: Round Rock.

Q: Lone Star?

A: Everything happens in Lone Star.

Q: What kind of degree did you get from that university?

A: I got a degree in electrical engineering.

Q: Did you have any further education?

A: Yes, I then got a master's degree in electrical engineering and a PhD in electrical engineering from Lone Star A & M University.

Q: I hesitate to ask, but where is that?

A: That's in Refugio.

Q: Is that in Lone Star?

A: We've discussed that already, haven't we?

Q: What have you done since you received your PhD?

A: I went to work for a private company that is involved in providing consultation in testimony in litigated cases involving electrical issues.

Q: Is that where you work today?

A: Yes, I have been there twenty years now.

Q: Do you have experience investigating wildfires?

A: Yes, almost the minute I walked in the door at Dynamic Experts, I was assigned to investigate a wildfire. In the course of my career, I began investigating more and more of those incidents, so I took the required courses to receive the required certifications to be a certified wildfire investigator.

Q: And how many wildfires have you investigated over the course of the last twenty years?

A: Probably 100 to 120.

Q: Have all of these matters involved litigation?

A: Every one of them.

Q: Have you testified in court previously?

A: Dozens of times.

Q: Has your testimony ever been rejected by any court?

A: Only twice, and both of those times the judge was just wrong.

Q: What was the basis for your exclusion?

A: Well, in both cases, the judge said I was relying on something called ipse dixit. But I gave the judge my word in both cases that these were my opinions and they were based on my experience and personal impressions.

Q: Were you asked to look into the facts and circumstances regarding the wildfire on March 16, 2017 involving Big City Electric Cooperative?

A: Yes, I was contacted about that fire two days after it occurred.

Q: What have you done to investigate the cause of this wildfire?

A: I reviewed the report from the Lone Star Forest Service investigator; I reviewed several photographs provided to me depicting the area where

the fire started; I reviewed a metallurgical report from a metallurgist; I reviewed the oral depositions of all of the witnesses who have been deposed in connection with this case.

Q: Have you formed opinions with respect to the cause and origin of this wildfire.

A: Yes, I have.

Q: In a summary fashion, can you tell me what those opinions and conclusions are?

A: Yes, I concluded that the fire started at the base of a transformer pole belonging to Big City Electric. Second, I concluded that the fire started because of a spark that fell from an area close to the transformer on that pole. Third, I concluded that the origin of that spark was a transformer jumper rubbing against a bare copper ground wire and causing sparks. And finally, I concluded that the installation of the transformer jumper in such a manner that it could rub against a bare copper wire and cause sparks failed to meet the standard of care for electric utility companies in these great United States.

Q: Okay, let's break that down. Your first opinion is that the fire started at the base of the pole. What is that opinion based on?

A: A couple of things. You should understand first that no one actually saw the fire start. However, once I investigated the scene, I was able to look at fire indicators on the ground. I followed the National Wildfire Coordinating Group guidelines for fire investigation, and I flagged various fire indicators as to whether at each point the fire was advancing, backing, or going laterally. After I had the flags in place, it was clear that the fire advanced from the base of the pole

and moved both back and laterally after that, but also moved rapidly forward with the wind.

Q: Can you identify Exhibit 23?

A: Yes, that's the Guide to Wildland Fire Origin and Cause Determination publication from the National Wildfire Coordinating Group. It's the Bible when it comes to wildfire investigations.

Q: And you followed that here?

A: Absolutely.

Q: Can you identify Exhibit 8?

A: Yes, this is an aerial view of the area where the fire started. You can make out the transformer pole in about the middle of the picture if you look closely.

Q: Did you run across any information at all that indicated that the fire started somewhere else other than at the base of that pole?

A: No, there's simply no evidence that it started anywhere else.

Q: Your second opinion is that the fire started because of the spark dropping from the pole; what is that opinion based on?

A: Well, we should talk about the second and third opinions together. The second opinion is pretty self-evident. If you have a spark and dry grass, it can and it will start a fire. So the question really is, was there a source for a spark at the location of this pole.

Q: Okay, let me ask that question. Was there a source of a spark at this pole?

A: Yes, there was. We found a lead going from an energized portion of the transformer over to what's called a triplex service drop, which just means there is a bare wire wrapped with two or three energized and insulated wires that goes from the pole over to the house. The transformer lead had been spliced in the middle with an aluminum clamp.

The aluminum clamp had been taped with electrical tape to protect it from sparking against something. There was also a ground wire attached to the transformer that ran over from the transformer to the pole and then to the ground. That ground wire had burned in two, and was in such a position that it was rubbing against the electrical tape on the aluminum clamp. The electrical tape had become completely frayed in one place, and there was distinct evidence of arcing both on the copper ground wire and the aluminum clamp. So, I concluded that there was a source for a spark.

Q: Did you locate a particle that would represent a piece of sparking metal at the foot of the pole?

A: Remember that lots of Big City trucks had tromped all over the site before I got there a week later to do my investigation. That's typical for electric companies. They burn stuff down and then hide the evidence. I mean, look at California, you know? Anyway, after they drove all over the scene of the crime, it would have been remarkable to be able to see any such particle of metal at that point.

Q: What happens to a spark when it hits the ground?

A: Well, in this case, scorched earth and mass destruction.

Q: I meant to the spark, not the ground. Would it leave a metal particle on the ground?

A: Normally.

Q: Was anyone able to locate any metal particles around the base of the pole in question?

A: Far as I can tell, nobody ever located the metal that ignited this massive fire.

Q: Did you look for metal particles?

A: Sure, I did a visual examination of the area.

Q: Is there some guideline for how metal particles can be located at a scene like this?

A: The Wildfire Origin & Cause Determinations Handbook typically encourages the use of magnets or metal detectors to locate metals in the area of origin. Here, it would have just confirmed what obviously happened so I'd say that is more of a suggestion then a requirement.

Q: Did you follow any of the practices outline at page 129 of that Handbook?

A: Yes, I looked at the scene visually, like with my eyes, as I told you.

Q: Did you do anything else in that list?

A: No.

Q: Did you use a magnifying glass to look at the area around the pole?

A: I did not see any point in doing that.

Q: Did you have a magnet with you?

A: Of course.

Q: Did you use the magnet to try to locate metal particles?

A: A magnet won't pick up aluminum. So, no.

Q: How about copper?

A: I don't recall if a magnet will pick up copper.

Q: Did you have a metal detector with you?

A: But of course.

Q: Did you use your metal detector to attempt to locate metal particles?

A: I was running short on time that day, so I decided to move along.

Q: Is it possible a better examination would have pointed to another area of origin?

A: Anything is possible, but no, that's impossible.

Q: Was any analysis done to confirm that the copper wire had actually come into contact with the aluminum clamp while energized?

A: Yes, not only was it obvious visually, but we took both of those parts, the ground wire and the aluminum clamp, to a lab and examined them first under a stereo microscope and then under a scanning electron microscope with energy dispersive spectroscopy. That's a mouthful, I know, so we normally just say SEM with EDS.

Q: Can you identify Exhibit 9 and Exhibit 10?

A: Yes, Exhibit 9 is a close up photograph of the copper ground wire, taken in with a stereo microscope. You can clearly see evidence of arcing on the copper ground wire end. Exhibit 10 is a photo of the aluminum clamp on the transformer jumper before it was removed. You can see the clamp all wrapped in tape at the top of the photo, and the copper ground wire is the thing that comes from the left side and bends into the area of the clamp. Again, under the stereo microscope, it is obvious that there is arcing of the surface of the aluminum clamp. You can make it out on this photo, even.

Q: Is there any way you can prove that the arcing on the ground wire or the arcing on the clamp came from a contact between those two?

A: Well, you could conclude that they were both purely coincidental, but you generally don't get arcing on those kinds of pieces of an electrical system without some contact between them. Nevertheless, the real answer to your question is yes, we can prove it.

Q: Okay, how can you prove it?

A: Using EDS, you can analyze the two surfaces to see what the actual chemical makeup is. In this case, we took the aluminum clamp, which is nothing but aluminum, and looked at it under the SEM and used EDS to evaluate what we were looking at. What we saw was basically aluminum, but we also saw deposits of copper on that aluminum.

Q: Can you identify Exhibit 11?

A: Yes, that is the output from the EDS we took on the clamp.

Q: What did that show you?

A: You can see that the clamp was mostly aluminum, as it should be. But you also see the presence of Cu or copper. The only way the copper could get onto the aluminum is through a transfer in an arc. When surfaces arc against each other, the metal in them becomes a plasma and it is exchanged from one surface to the other. That's what we're seeing here. This copper on the aluminum is the result of an arc and nothing else.

Q: Did you look at the copper ground wire in the same way?

A: Of course. And Exhibit 12 is the EDS output for that examination. It shows that the copper wire was, as advertised, copper. But we also see deposits of aluminum on that copper ground wire. Again, the only way that can happen is through an arc.

Q: So, you keep saying that an arc will transfer these materials. What does that have to do with a spark that might start a fire?

A: When you get an arc, you get a spark. The only question is how big the spark is and how hot it is.

Q: How hot would an arc be in this system as it is configured?

A: Somewhere around 10,000 degrees Fahrenheit.

Q: That sounds pretty hot. Is there anything you can compare that to?

A: The surface of the sun.

Q: Is the spark that hot when it falls to the ground?

A: Well, no. It cools superfast as it falls.

Q: What kind of temperature would it take to ignite dry grass at the base of the pole?

A: If you'll look at Exhibit 24, you can see that the temperature to ignite dry grass is about 325 degrees Celsius, which is about 617 degrees Fahrenheit.

Q: So, you've established where you think the fire started, that is at the base of the pole. You've told us you have proof of an arc between the transformer jumper and the ground wire. Your final opinion had to do with the standard of care of a utility. And what is that opinion?

A: Big City Electric failed to meet the basic standard of care that a utility company ought to be held to. There are a couple of problems here. The jumper wire itself, the lead between the transformer and the triplex, was too long and it was therefore able to swing in the wind. We had high winds on the day of the fire, and there's no doubt in my mind that the transformer jumper was swinging in that wind. Also, the transformer lead was spliced in the middle with this clamp. There's no reason to do that. This jumper stuff is pretty cheap. If you have a broken jumper, you ought to just measure enough to do the job so that there's not a splice in it anywhere with an aluminum clamp. And finally, if you are going to use an aluminum clamp in the middle of a transformer jumper that's way too long anyway, you shouldn't wrap it with electrical tape. But if you do, you should wrap it with enough electrical tape that it is actually protected. Here, the electrical tape got worn off by constant rubbing on the ground wire. The ground wire and the clamp then arced together, and the ground wire was severed by that arcing, which is what you see in Exhibit 13.

Q: Based on your experience and training, was Big City Electric negligent in the way it installed this transformer jumper and the ground wire?

A: Yes, it is my opinion that Big City Electric was negligent in the way it did this work, and it is further my opinion that the negligence of Big City was a proximate cause of the fire.

Q: In reaching your opinions, did you consider the testimony of Chris Evans concerning where he saw the fire when he initially arrived?

A: I understand his desire to protect the defendant, but his testimony does not wash.

Q: Why do you say that?

A: Look at two things. First, the 911 call was placed at exactly 2:41:58. That's from the 911 call center records marked as Exhibit 14. Then look at the metadata from Mr. Evan's photos. Those photos are marked as Exhibits 15 and 16, and the metadata is marked as Exhibit 17. For reference, Exhibit 15 is IMG-02384 and Exhibit 16 is IMG-02387. You'll notice there's a gap in the image numbers there.

Q: What does that mean?

A: It means he took two photos between those Exhibits that we don't seem to have. Mr. Evans is keeping something from us, is what it means.

Q: What does all that add up to, in your opinion?

A: If you track his story about his activities, the times don't add up. Something's wrong, and it looks to me like the fire was further progressed when he made that 911 call than he's now saying.

Q: Have we covered all the opinions and conclusions you've reached in this case?

A: Yes, we have.

Q: Can you state your name?

A: My name is Chris Evans.

Q: Where do you live?

A: Here in Armadillo, in the great state of Lone Star.

Q: Where were you raised?

A: Here in Armadillo, in the great state of Lone Star.

Q: Did you graduate from high school here in Armadillo, in the great state of Lone Star?

A: Yes, I graduated from Armadillo High School, then I went on to attend the University of Pittsburgh.

Q: In Pennsylvania?

A: No, in Lone Star. I got a degree in business administration.

Q: What did you do after you graduated from that fine university?

A: I went to work for Big City Electric Co-op.

Q: How many years ago was that?

A: That was twenty-five years ago.

Q: Twenty five years is a long time.

A: Yes, but when you find a place as good to work as Big City Electric, you have no reason to go anywhere else.

Q: What do you mean?

A: Big City Electric provides the provides big city quality with a small town feel. Without BCE, most of these people wouldn't have electricity at all. Most of those big outfits don't have any interest in servicing rural areas like our community. Not enough customers to warrant the expense of building the lines. But BCE wanted to give people a chance to develop their land, to farm, to ranch, to provide for their families. Companies like that are few and far between.

Q: Can you identify Exhibit 31?

A: Yeah, that's a photo of the very first customer that BCE served. Fred and Myrtle Spasnick. Before that day, they'd been sitting in the dark singing to each other. With the electricity provided by Big City, they could listen to the radio their son had bought them for Christmas. That photo always makes me tear up.

Q: What is your position or title today?

A: I am the general manager of Big City Electric.

Q: I imagine you did not start out as general manager, is that correct?

A: Correct. I started out working with distribution line crews, building distribution lines.

Q: Was that one of the entry-level jobs at Big City Electric?

A: Yes, that's pretty much the bottom rung of the ladder. But I climbed the rest of the ladder and got to be general manager five years ago.

Q: We're here to talk about the fire that happened on March 16, 2017. When did you become aware of that fire?

A: I became aware of the fire at approximately 2:30 p.m. One of the employees of Big City called in on his cell phone and said there was smoke coming from the area of the Watson Ranch. I wasn't far from there, so I immediately drove to the Watson Ranch to see what was going on.

Q: Why were you out in that general area?

A: A customer had called in with a complaint that the power was off, and I wasn't doing anything better, so I went out to see what was going on with that.

Q: Did you then head to the Watson Ranch headquarters?

A: Yes, I could see smoke from about a half mile away, and so I drove directly to the headquarters.

Q: How close did you get to the headquarters?

A: Well, I got about a quarter mile away, and I called 911 because I could see some flames in the bar ditch.

Q: How did 911 respond to your call?

A: The operator asked if this was about those boys shooting fireworks. I told her I didn't understand what she was talking about, and she then said that they would send the fire department out as quickly as possible.

Q: Can you identify Exhibit 28?

A: Yes, that's a transcript of the call I made to 911.

Q: What did you do after you called 911?

A: I drove on down to the ranch headquarters itself. When I got just about even with the residence, I could see smoke and fire coming from the ditch.

Q: Could you see smoke and fire coming from any place else?

A: No, at that time, the fire was totally confined to the ditch.

Q: Can you identify Exhibit 26?

A: Yes, that's an aerial view of the Watson Ranch Headquarters. I've superimposed some information on the photo, indicating what I saw when I first drove up to the residences there.

Q: Are you familiar with the transformer pole that serves the residence?

A: Yes, I am. About five years ago, I worked at making a repair at that location.

Q: What repair was that?

A: The service to the house, which is called a triplex wire, had been struck by an implement of some kind, and it had been torn down. That also tore down the transformer jumpers. So I put up a new triplex and I put up new transformer jumpers.

Q: Looking at Exhibit 13, are you the person who spliced the transformer jumper with this aluminum clamp and tape?

A: I have no independent recollection of ever doing something like that.

Q: From your familiarity with the transformer pole, can you tell the jury about how far away the pole is from the ditch?

A: It is right at 200 feet.

Q: What is that 200 feet made up of? What's between the pole and the ditch?

A: It's all dry grass. That time of the year, anyway.

Q: And let me ask you specifically; did you see any fire at all in the dry grass between the ditch and the transformer pole when you arrived?

A: No, I did not.

Q: How often was this distribution line inspected by Big City Electric Co-Op?

A: The RUS or Rule Utility Services guidelines specify that a distribution line should be inspected at least once every three years, and we adhere to those guidelines.

Q: Can you identify Exhibit 18?

A: Yes, this is Rule Utility Services Bulletin 1730-1. It sets out certain standards for inspection of distribution lines.

Q: Was the line to the Watson Ranch a distribution line?

A: Yes. The other choice is transmission line, which is higher voltage and has different standards.

Q: Does Exhibit 18 give a standard for inspecting distribution lines?

A: Yes, you'll find that on page 10.

Q: Was this specific distribution line inspected within three years of the fire?

A: Yes, Exhibit 19 is a Service Order. It contains 5 pages showing the inspections that were done on this line. You will find that those were done within three years of the fire.

Q: Can you explain what we are looking at on Exhibit 19?

A: Yes, the simplest way to look at it is to look at the bottom left hand side of the page where you see a list of things that were repaired on these lines as we inspected them. You can see the "General Comments" part there where we show what line we were working on. In this document, we were working on "Lucky Sub-East" and then it shows a code for Substation No. 8, Feeder Line No. 3. That's the line that runs to the Watson Ranch.

Q; Can you tell what was done on that Feeder Line on August 8, 2014?

A: Yes, that's under "Service comments." It shows what work was actually done on that line on the date of the Service Order.

Q: Can you tell what repairs were done on a specific pole?

A: No, the records don't show that.

Q: Getting back to the transformer jumper, is it your testimony that you did not leave the transformer jumper spliced with an aluminum clamp?

A: I have no independent recollection of doing that.

Q: Can you identify Exhibit 20?

A: Yes, that's a photograph of the jumper with the aluminum clamp and the electrical tape all over it.

Q: Did you do this?

A: I have no independent recollection of that.

Q: Have you used electrical tape to cover connections before?

A: Yes, it's an accepted practice to use electrical tape to protect connections.

Q: Can you identify Exhibit 25?

A: Yes, that's a box that our electrical tape comes in. You can see on box there that the tape will protect up to 600 volts.

Q: What was the voltage being carried by the transformer jumper?

A: 120 volts.

Q: Does the co-op have any records that would indicate who might have worked on this specific transformer jumper after you did five years prior?

A: We don't keep records that are that detailed.

Q: So you've told us that you drove down to the residence, and saw fire in the ditch but nowhere else. How long did you stay there?

A: About five minutes. There wasn't anything I needed to do there at the moment.

Q: What did you do then?

A: I drove back up the county road about a quarter of a mile, turned around and watched the fire to see what it was going to do.

Q: Why?

A: Well, it seemed to be confined to the ditch, so I thought it might stay there and not spread anywhere else, so I just wanted to see how it was going to move.

Q: How long did you sit there watching the fire?

A: Probably 10 to 15 minutes.

Q: Then what did you do?

A: I drove further north on the county road, I thinks it's CR 40, then stopped where it intersected with that state highway, I think the number is175. I sat there waiting for the fire trucks.

Q: How long did you stay there?

A: About 15 minutes, I guess.

Q: Could you still see the fire?

A: Not as well, so when I got bored waiting for the fire department, I drove back down to about a quarter mile from the residence to see what the fire was doing.

Q: Can you identify Exhibits 15 and 16?

A: Yes, these are photographs that I took with my cell phone.

Q: When did you take them?

A: Well, after I drove back toward the ranch headquarters.

Q: Can you identify Exhibit 17?

A: Yes, that's a printout of the metadata from the two photographs that I took after I had gone back up the road a quarter mile and turned around.

Q: What do these photographs show?

A: They show the fire had spread out behind the house and into that area where the transformer pole is.

Q: What happened next?

A: The fire chief drove by me and went down to the ranch headquarters, then turned around and came back past me. I saw that the fire had burned out around the house, so I went back down to see if our equipment was damaged.

Q: What did you find?

A: I saw that a copper ground wire on the transformer pole was broken, so I got in my bucket and went up to look.

Q: What did you see?

A: I saw the broken ground wire, so I spliced it back together with a clamp. I also saw this clamp on the transformer jumper and saw that the tape on it was worn, so I took a little extra time and pulled it down and put up a new jumper.

Q: Can you identify Exhibit 30?

A: That's a photo of the transformer at the Watson Ranch. I've illustrated it to show the ground wire and the transformer jumper.

Q: Was this the way you found it on the day of the fire?

A: No, this was after I had fixed it. You see the clamp on the ground wire? I put that there when I cut out the broken parts.

Q: And is this a new transformer jumper?

A: Yes, I put that up after I took the old one down.

Q: What did you do with the jumper you took down?

A: I threw it in the back of my truck to take back to the shop and throw away.

Q: But you didn't throw it away—we have it in evidence now, don't we?

A: Yes, when I got back to the shop, our safety guy was standing there and he stopped me from throwing the jumper in the trash.

Q: Why'd he do that?

A: He said we might want to keep it around to show folks how to tape up a clamp.

Q: Or how not to?

A: Whatever.

Q: Did you talk to the Forest Service investigator about this fire?

A: Yeah, I talked with him a day or two after the fire.

Q: Did you tell him what you saw when you were at the Watson Ranch on the day of the fire?

A: Sure, I told him exactly what I saw.

Q: Can you identify Exhibit 27?

A: Yes, that's my statement to the investigator.

Q: Have you told us everything you recall about your activities on the day of the fire?

A: Yes.

Q: Tell us your name please.

A: My name is Shawn Braker.

Q: Where do you live?

A: I live in Tomball, Lone Star.

Q: Where were you raised?

A: I was actually raised in a state other than Lone Star, so I don't like to talk about it too much.

Q: Well humor us and tell us where you were raised.

A: I was raised in Broken Arrow, Oklahoma.

Q: That wasn't so hard. Did you go to high school there?

A: Yes, Oklahoma has high schools.

Q: That's not really the point of my question. I was just getting some background information. What did you do after high school?

A: I went to college, which it turns out Oklahoma has some of those, too.

Q: Where did you attend college?

A: Oklahoma State University in Stillwater, Oklahoma.

Q: Did you complete a degree program there?

A: Yes, I got a degree in electrical engineering.

Q: What did you do after you graduated from that fine university in the great state of Oklahoma?

A: I went to work for Oklahoma Gas and Electric, also known as OG&E. I worked there for fifteen years in their electrical engineering group.

Q: What specific kinds of things did you do for OG&E?

A: During that entire time, I was involved in the design of distribution lines and their various component parts, such as transformer installations and the service lines running over to residences and businesses.

Q: What did you do after you left OG&E?

A: I opened my own consulting business. I consult with people who are involved in litigation mostly, but I also do design work for smaller utility companies that don't have their own electrical engineering departments.

Q: Have you testified in court before?

A: I have testified in court approximately fifteen times over the last ten years that I've been doing this.

Q: Has your testimony ever been excluded by any court?

A: Only once.

Q: Why was it excluded?

A: The court said something about an analytical gap. I didn't really quite understand what they meant.

Q: Were you asked to look at the facts and circumstances in connection with the fire of March 16, 2017 involved in this case?

A: Yes, I was asked to look at it and render opinions in respect to various issues.

Q: What exactly did you look at in connection with your assignment here?

A: I looked at the photographs of the electric installation in question. I read all of the depositions. I looked at the output from the scanning electron microscope and the energy dispersive spectroscopy. I looked at the report from plaintiff's expert Andy Russell.

Q: Were you able to reach opinions and conclusions regarding the origin and cause of this fire?

A: Yes, I was able to reach conclusions about that and I was able to reach conclusions regarding the question of whether this electrical installation in fact complied with the requirements of National Electrical Safety Code, also known as the NESC.

Q: Let's start with the origin and cause issue. What opinion did you reach about where this fire started?

A: In my opinion, the fire started in the bar ditch about 200 feet away from the transformer pole identified by Andy Russell.

Q: How quickly were you able to get out and take a look at the scene of this fire.

A: I was unable to get there until about four weeks after the fire.

Q: What did the scene look like at that point?

A: People had driven all over it at that point, but I was still able to identify some of the wildfire indicators that one would examine in trying to determine an area where a fire started.

Q: Can you identify Exhibit 8?

A: Yes, that's a photo of the ranch headquarters. It shows that the fire eventually burned around to the north side of the houses that are there and around the base of a transformer pole that served those houses. You can see all the tire tracks where people drove over the scene of the fire. It was like a dually rodeo out there.

Q: What you able to examine at the fire scene when you were able to get there?

A: Well, mostly I was able to look at the bar ditch because nobody had driven in it. It appeared to me, just you know looking at it four weeks afterward, that some of the fire indicators pointed to a fire starting in the ditch.

Q: What fire indicators were still there four weeks later?

A: There was ample grass debris remaining, along with a couple of small mesquite trees and some fecal matter from one or more bovines.

Q: Did you do an analysis of these fire indicators?

A: Yes, I did. I followed the guidelines in the National Wildfire Coordinating Group's publication, which is marked as Exhibit 23.

Q: What did you observe in terms of fire indicators?

A: I saw some grass stems that were burned in such a way that indicated the fire was traveling from the area of the ditch toward the transformer pole. I saw burn marks on the mesquite tree trunks that were consistent with the fire approaching those trunks from the ditch side.

Q: Did you take photos of the fire spread indicators that you found?

A: Yes, Exhibit 21 is a photo of some grass blades. There's also a little bovine fecal matter in that picture. But anyway, you can see the grass blades are burned more on one side than the other, indicating the direction of the fire at its inception, when it wasn't a roaring blaze yet. If you'll look at Exhibit 23, you'll see very similar burn patterns on grass on Page 51.

Q: What does this indicate to you?

A: It tells me the fire was advancing slowly because it just started, and it was advancing toward the residence and the transformer pole, not away from it.

Q: What is Exhibit 22?

A: That shows a classic cow patty. Just like Exhibit 21, this shows a slowly advancing fire, indicating that the fire had not built up any momentum yet.

Q: And what does the bovine fecal matter demonstrate in terms of fire direction?

A: The cow patties were burned more on one side than the other, and the burn markers indicated that the fire was traveling laterally from the

center of the ditch toward the fence around the property, which would be toward the transformer pole.

Q: What about the mesquite tree trunks?

A: No, I forgot to take photos of those.

Q: Was there any other evidence that would lead you to believe that the fire started in the ditch?

A: Well, of course, there's the clear testimony of Chris Evans. Evans is the only person that even comes close to being an eyewitness to the start of this fire.

Q: Can you identify Exhibit 27?

A: Yes, that's the statement that Mr. Evans gave to the Lone Star Forest Service fire investigator the day after the fire. That investigator is a law enforcement official, and lying to him is a crime, by the way.

Q: What conclusion did you draw from the statement of Chris Evans?

A: Because Evans was there early, because there are no other eyewitnesses, and because it is somewhat consistent with my view of the wildfire indicators in the ditch, I came to the conclusion that Evans was correct, the fire started in the ditch. So Mr. Evans did not lie to the investigator, which is a good thing.

Q: What implications does that have for the opinion of Andy Russell?

A: Andy is wrong.

Q: Do you agree that Mr. Russell was able to look at the site much sooner than you were?

A: That's really unimportant when you have an eyewitness who identifies a place completely different from the so-called fire indicators. Andy can't just ignore Chris.

Q: Did you reach any conclusions regarding the evidence that an aluminum clamp and a copper ground wire had sparked together?

A: Yes, I looked at that situation I concluded that it was not a cause of the fire.

Q: What's the basis for that opinion?

A: First, let me be clear about one thing. There was arcing between the aluminum clamp on the transformer jumper and the copper ground wire at some point in time. But the SEM and EDS work is just unable to reveal to us at what point in time that might have been. Could have been a day earlier. Could have been a week earlier. Could have been a year earlier. There's no way to tell.

Q: Wouldn't arcing like that have resulted in loss of power to the residents? Wouldn't that be a pretty good indicator of when the arcing happened?

A: No, the arcing was on a transformer jumper that was carrying 120 volts. The arc did not generate enough fault current to trip a 3 amp fuse above the transformer. The arc could have happened at any time because the electricity never wavered in the houses that are attached to this installation.

Q: How do you know the transformer fuse did not blow as a result of this arcing?

A: I looked at the testimony of Chris Evans. He said that the fuse above the transformer was not blown. The arc was not sufficient to create enough fault current to blow the fuse.

Q: Do you have an opinion as to whether arcing between the transformer jumper clamp and the ground wire would have caused a spark hot enough to start a fire 25 feet below it?

A: Yes in my opinion that was not going to happen.

Q: Why not?

A: A 120 volt arc is simply insufficient to generate the kind of fault current that would cause a spark of such size and heat that it would start a fire after falling 25 feet. A spark is just a super-heated but very small piece of metal coming off an arc. The smaller the piece of metal the more quickly it cools. So while the arc causes a lot of heat at the actual point of contact, a spark coming off of the arc cools down very, very rapidly.

Q: How hot is an arc at 120 volts?

A: Maybe 10,000 degrees Fahrenheit.

Q: Isn't that close to the heat of the surface of the sun?

A: Pretty much.

Q: Have there been any studies to determine how fast sparks of different sizes and generated by different voltages will cool off?

A: I did a study once that attempted to quantify that. We arced a lot of stuff together at different voltages and then tried to measure the temperature of sparks coming off of the arc. Unfortunately, the sparks cooled down so fast that we really couldn't quantify anything. However, that doesn't stop us from making engineering calculations, and my engineering calculations indicate a spark coming off a 120 volt arc would not retain enough heat to start grass on fire 25 feet below it.

Q: What is your best engineering judgment about the heat of any spark from this 120 volt system?

A: My best engineering guess is that a spark that came off of that jumper or ground wire and fell 25 feet to the ground would be no more than 400 degrees Fahrenheit, more or less.

Q: What is the amount of heat required to start dry grass on fire?

A: About 575 degrees Fahrenheit.

Q: Can you identify Exh. 24?

A: Yes, that's an excerpt from a study by the National Institute of Standards and Technology. It sets forth some ignition temperatures. Andy Russell thought the results for May Tall Fescue were most analogous to the grass we found at the ranch headquarters, but I think the grass there is really Old World Bluestem.

Q: Would that make a substantial difference in terms of ignition temperature?

A: Who knows? That wasn't tested by the NIST. Andy's just guessing.

Q: Let's turn to the issue of compliance with standards for a moment. Do you have an opinion as to whether this transformer jumper installation complied with NESC requirements?

A: So, let me first stay that you will notice that Andy Russel's report does not cite any part of the NESC at all. He refers only to the RUS Standards. There is no NESC standard that says a transformer jumper has to be of a specific length or has to withstand swinging in a specific wind.

Q: Well, is there a requirement that distribution lines and associated equipment like a transformer installation have to be able to withstand a certain amount of wind?

A: Well yes, as you see in Exhibit 29, which is Table 250-2(c) from the NESC, this fire started in an area where installations have to be able to withstand a 90 mile an hour 3 second wind gust.

Q: Was this jumper designed to withstand a three second gust at 90 MPH?

A: In my opinion, it was. Again, you won't find a specific reference point for transformer jumpers in the NESC. But the general rule is they need to be safe. This was safe.

Q: Do you have an opinion about the use of electrical tape around this aluminum clamp?

A: That, too, is a safe practice. Look at it this way. For electricity to jump one inch, you have to have 84,000 volts. We had 120 volts here. Do the math. In order for a spark to jump from a bare aluminum clamp to a bare copper wire, they have to be touching. Here, as I understand it, the jumper would usually be around 4 inches away from the ground wire. Under ordinary circumstances, it would take an extraordinary amount of electricity to get an arc started, and then you have to get through the fact that there's an insulative material in the form of electrical tape rated to insulate against 600 volts.

Q: Can you identify Exhibit 25?

A: Yes, it's the box that electrical tape comes in, showing the insulation rating.

Q: Should this installation have been examined or inspected in order to ascertain whether there was a problem before this fire happened?

A: No, inspection of electrical facilities is a function of the importance of the line and the amount of risk involved with the line. A big transmission line carrying 500,000 volts needs to be inspected very frequently because of the importance of the line and because of the consequences of something going wrong. The transformer jumper serving a single residence is not the kind of thing that a reasonably prudent utility company would spend its time inspecting. That is not what reasonably prudent utility companies do.

Q: Even though a spark from such a line could start a fire like this one that causes death and destruction of property for a lot of people?

A: You're just talking from hindsight now. The question is what reasonably prudent utility companies would do under the same circumstances, not what some Palsgraf machinations might produce.

Q: Are you saying that it is not reasonably foreseeable that an arc can cause a spark that would cause a grassfire?

A: No, I'm not saying that. I'm just saying that the arc itself was not foreseeable.

Q: Do you have any alternative explanation for how a fire could have started?

A: Yes. There was a 911 call about a half hour before the Chris Evans call. The caller, an author as I recall, said that he saw a couple of youths shooting off fireworks near the Watson Ranch headquarters.

Q: Are you referring to Exhibits 3 and 32?

A: Yes, both of those. As you can see in Exhibit 14, the Evans 911 call was received at 2:42 p.m. There was a call at 2:25 p.m. reporting the reckless use of fireworks on that windy day. We see from Exhibit 32 that these individuals were about a half mile east of the ranch headquarters. In my opinion, the fire was more likely started by fireworks, then back burned to the ranch headquarters.

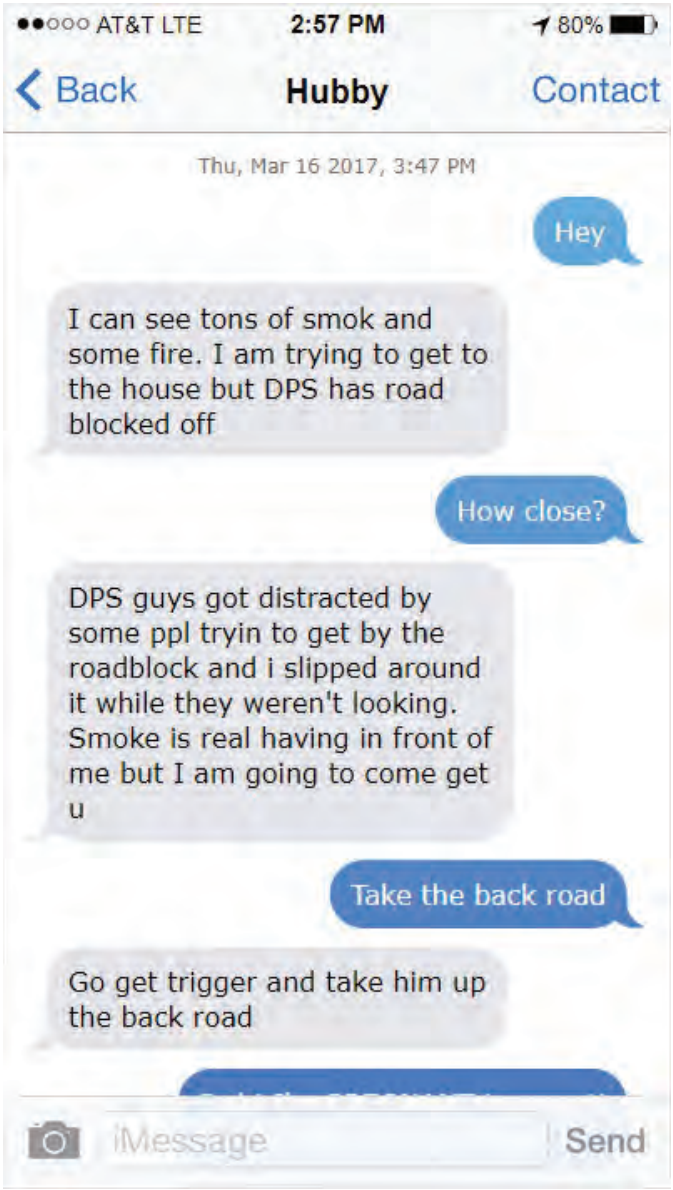
Q: Did these youths report having started a fire?

A: No, they probably fled to their mother's basement at that point and started playing Dungeons and Dragons or some other game. And you can see that the 911 operator pretty much blew off this report when she should have dispatched someone to check it out.

Q: Have we discussed all the opinions and conclusions you've reached in this case?

A: Yes, we have.


Taylor Home
Watson Ranch Headquarters
EXHIBIT 1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80%
Back
Hubby
Contact
Thu, Mar 16 2017, 3:47 PM
Hey
I can see tons of smok and some fire. I am trying to get to the house but DPS has road blocked off
How close?
DPS guys got distracted by some ppl tryin to get by the roadblock and i slipped around it while they weren't looking. Smoke is real having in front of me but I am going to come get u
Take the back road
Go get trigger and take him up the back road
iMessage
Send

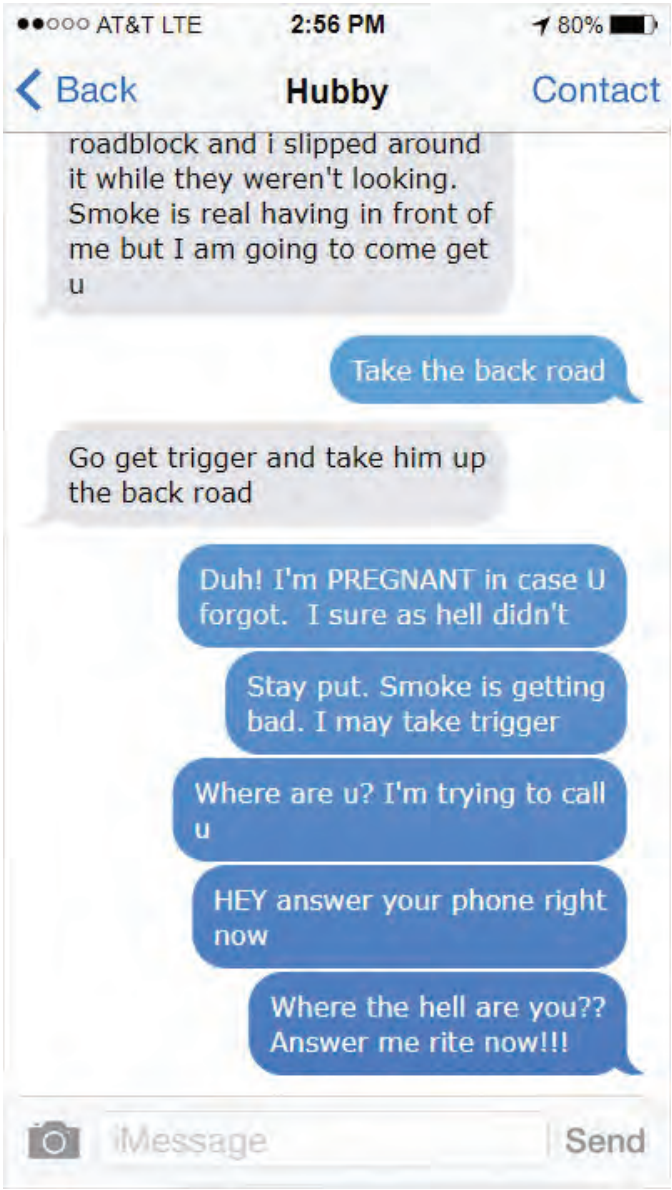

●●○○○ AT&T LTE
2:56 PM
80%
Back
Hubby
Contact
roadblock and i slipped around it while they weren't looking. Smoke is real having in front of me but I am going to come get u
Take the back road
Go get trigger and take him up the back road
Duh! I'm PREGNANT in case U forgot. I sure as hell didn't
Stay put. Smoke is getting bad. I may take trigger
Where are u? I'm trying to call u
HEY answer your phone right now
Where the hell are you?? Answer me rite now!!!
iMessage
Send

EXHIBIT 2

TRANSCRIPTION OF GARY WINTERS 911 CALL

1.	DISPATCHER:	Good afternoon. 911 Call Center. What's your emergency?
2.	MR. WINTERS:	Yes ma'am, this is Gary Winters. I was just driving by the Rock'n Tree Ranch and I saw a couple of boys out shooting fireworks. It's real windy out here and I'm afraid they' going to start a fire.
3.	DISPATCHER:	Where exactly were these boys?
4.	MR. WINTERS:	Well, they're east of that county road that runs by the Watson Ranch headquarters, you know? They're probably a half mile east of that Watson place. The wind is blowing something fierce out of the southwest, and if they start a fire, well, Katy bar the door on getting it stopped.
5.	DISPATCHER:	Are these the Matthews twins, by any chance?.
6.	MR. WINTERS:	Well, maybe. What do they look like?
7.	DISPATCHER:	Twins. They look like twins. They're about 10 years out of high school.
8.	MR. WINTERS:	Yeah, that's them all right. Looks like they're in their late twenties.
9.	DISPATCHER:	Well, I'll call them up and tell them to quit lighting off fireworks and go back to their momma's basement and play Minecraft.
10.	MR. WINTERS:	OK, then. I'll leave it in your good hands.
11.	DISPATCHER:	Thanks for calling in and have a great day.

EXHIBIT 3


EXHIBIT 4


EXHIBIT 5


EXHIBIT 6

EXHIBIT 7 (PROVIDED SEPARATELY)


EXHIBIT 8


5 mm
EXHIBIT 9
2019/08/07 70685X-M001-0012


EXHIBIT 10

70685X EDS005
Item 2

Elt.	Line	Conc.	Units
O	Ka	5.55	wt.%
Al	Ka	47.86	wt.%
Cl	Ka	0.18	wt.%
Cu	Ka	46.42	wt.%
		100.00	Wt.%

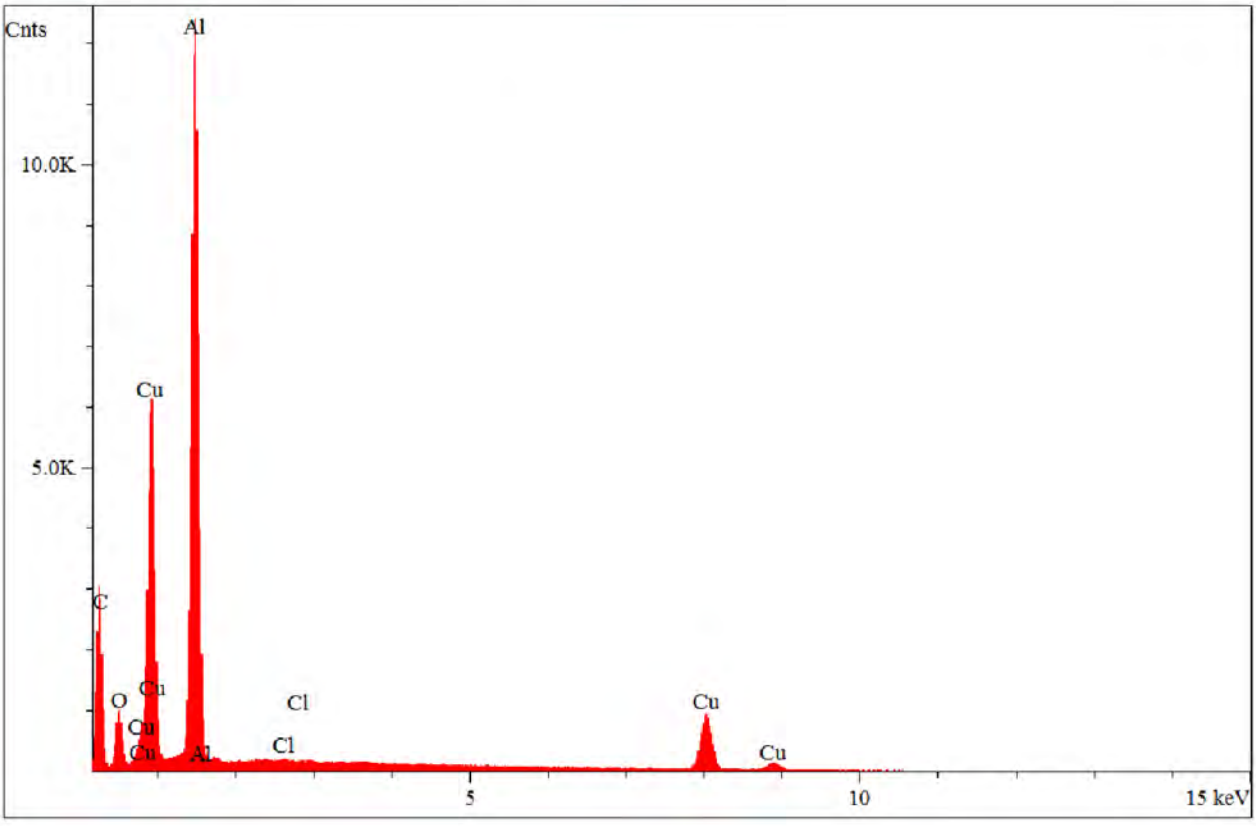


EXHIBIT 11

70685X EDS007
Item 2

Elt.	Line	Conc.	Units
O	Ka	20.88	wt.%
Mg	Ka	0.38	wt.%
Al	Ka	12.87	wt.%
Si	Ka	0.86	wt.%
S	Ka	0.26	wt.%
Cl	Ka	5.49	wt.%
Ca	Ka	0.65	wt.%
Cu	Ka	58.61	wt.%
		100.00	Wt.%

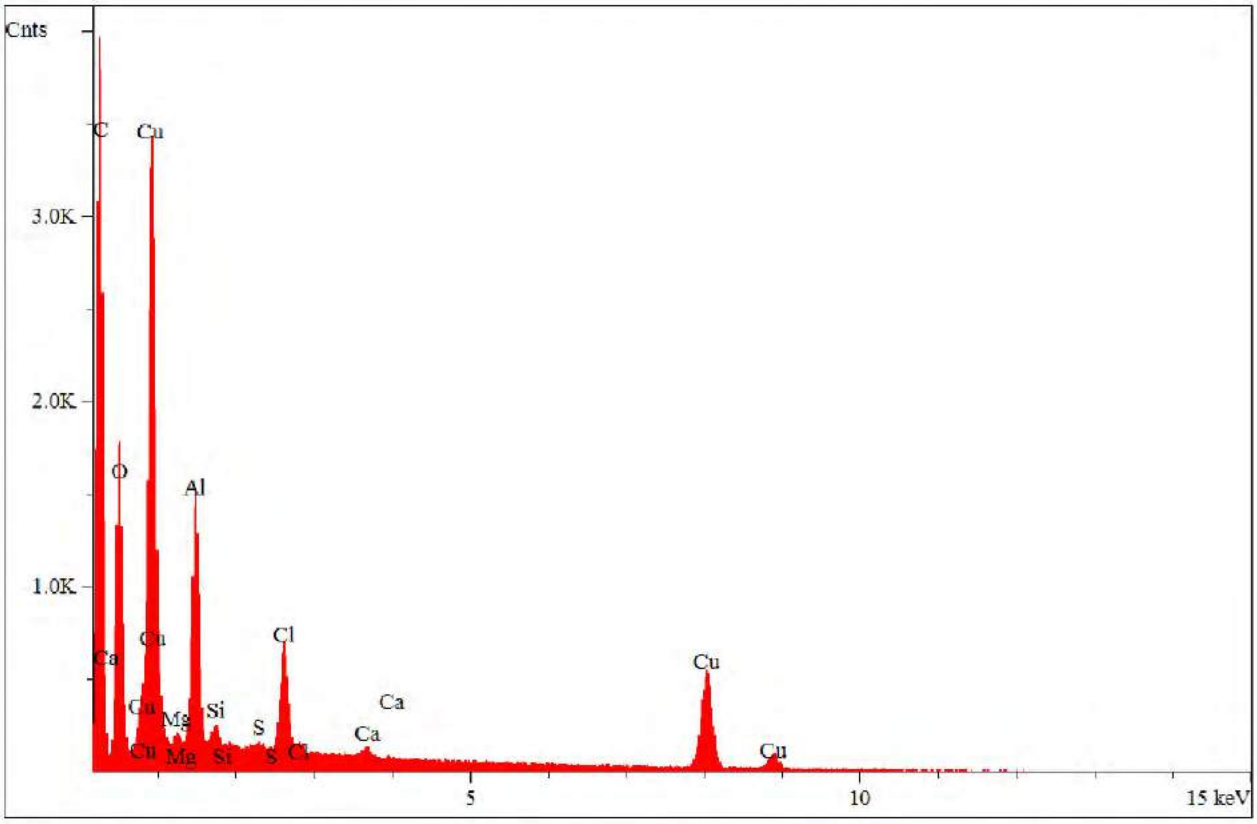


EXHIBIT 12


EXHIBIT 13

Call Sheet Report
Armadillo 911 Center

Call #: 17-0936
Date/Time: 3/16/2017 14:42:54
Type: FIRE CALL
Priority: HIGH
How Rcvd: PHONE
Caller ID: Evans, Chris 478-511-5487
Sent to Dispatch: 03/16/2017 14:45:12

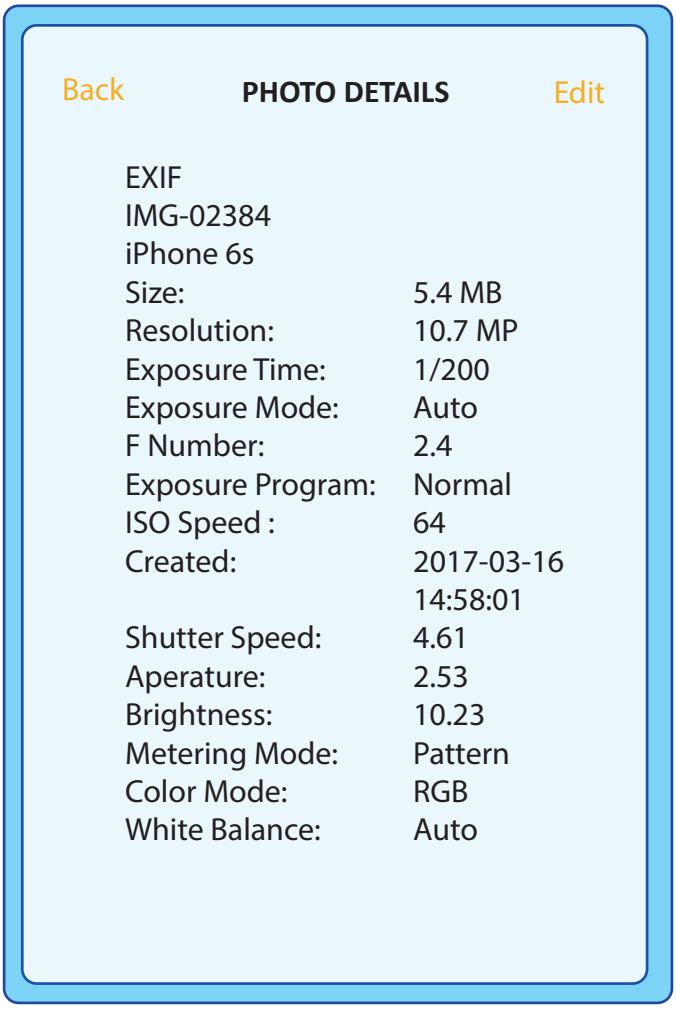
Dispatcher: West, Gaines
Disposition: Assigned, Completed

Call to Location:
Watson Ranch HQ

EXHIBIT 14

EXHIBIT 15

EXHIBIT 16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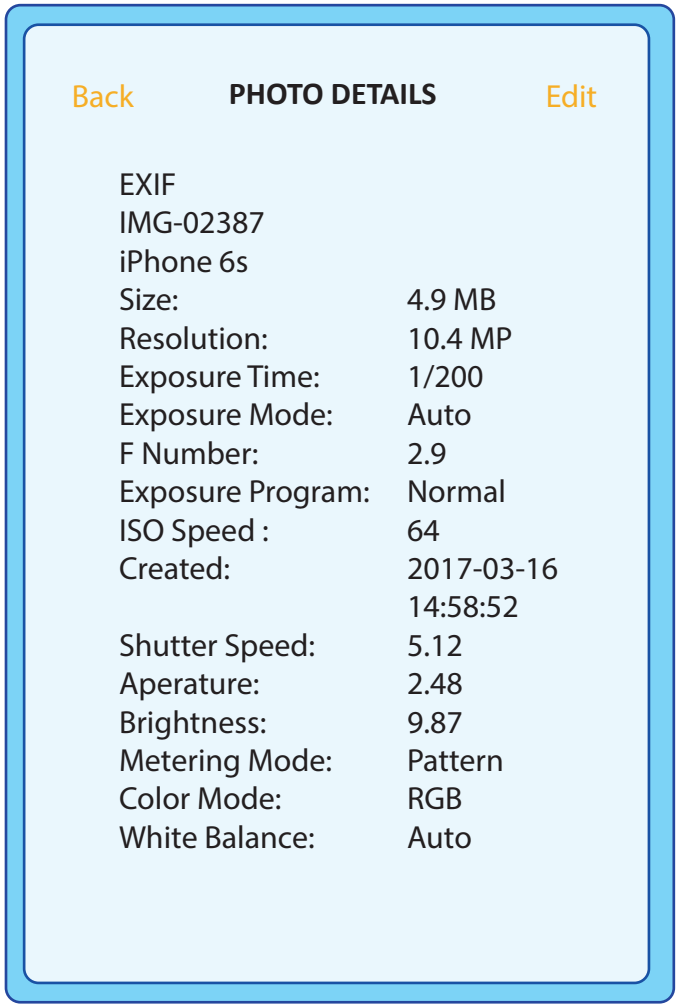
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Color Mode: RGB
White Balance: Auto

EXHIBIT 17

Disclaimer: The contents of this guidance document does not have the force and effect of law and is not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies.

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Utilities Service

Bulletin 1730-1
RD-GD-2016-84

SUBJECT: Electric System Operation and Maintenance (O&M)

To: RUS Electric Borrowers and RUS Electric Staff

Effective Date: Date of Approval

Office of Primary Interest: Engineering Standards Branch, Office of Policy, Outreach, and Standards

Filing Instructions: This Bulletin replaces Bulletin 1730-1, Electric System Operation and Maintenance, dated April 12, 2011.

Purpose: This bulletin contains guidelines related to electric borrowers' operation and maintenance (O&M) and outlines the Rural Utilities Service's (RUS) standard practices with respect to review and evaluation of O&M practices.

Assistant Administrator
Electric Program

9/23/16
Date

EXHIBIT 18

TABLE OF CONTENTS

INDEX: Inspection
Maintenance
Operation and Maintenance
Records

ABBREVIATIONS

ANSI	American National Standards Institute
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
CT	Current Transformer
EMF	Electric and Magnetic Fields
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
FERC	Federal Energy Regulatory Commission
GFR	General Field Representative
IFT	Interfacial Tension
kVA	Kilovolt-Ampere
kW	Kilowatt
kWh	Kilowatt-hour
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
O&M	Operation and Maintenance
OCR	Oil Circuit Recloser
PCB	Polychlorinated Biphenyl
PSD	Power Supply Division
PT	Potential Transformer
REA	Rural Electrification Administration
RUS	Rural Utilities Service

1. Purpose

This bulletin contains guidelines related to electric borrowers' operation and maintenance (O&M) and outlines the Rural Utilities Service's (RUS) standard practices with respect to review and evaluation of O&M practices. 7 CFR 1730 contains the policies and procedures of RUS related to electric borrowers' O&M practices and RUS's review and evaluation thereof. The express and exclusive purpose of this bulletin is to protect RUS by protecting and preserving its loan collateral. This bulletin does not supersede or replace any practices or procedures as they relate to safety, including, but not limited to those practices or procedures referenced herein, and does not address any safety aspects in regard to the electric borrowers' electric infrastructure or safety practices or procedures.

Borrowers that are required to be registered on the NERC Compliance Registry are responsible for meeting all of the applicable standards as required by the borrowers' specific functional registrations. It is not the intent of this bulletin to encompass, supersede or replace the reliability requirements enforced by NERC and its associated regional reliability organizations. Borrowers may choose to research, implement or incorporate some or all of the NERC standards into their operational procedures.

2. Borrower Guidelines

a. Records: Each borrower is responsible for maintaining records of the physical and electrical condition of its electric system. Any or all of these records may be reviewed by RUS during its review and evaluation. Such records include, but are not limited to:

(1) Service interruption and power supply outage reports.
(2) Overhead and underground line patrol, inspection and maintenance records, including pole inspection.
(3) Substation inspection and maintenance records.
(4) Overcurrent (non-fuse) apparatus records (recloser, sectionalizing, relay-protected)
(5) Line voltage regulator records.
(6) Distribution transformer records.
(7) Oil handling and storage records

(8) Meter records.

(9) Right-of-way maintenance records.

(10) Line voltage and amperage records.

(11) Avian protection/contact records

(12) System maps.

(13) System loss records.

(14) Idle services records.

(15) Power quality investigation records.

(16) Other records as required by local, state or other governmental entities

b. Emergency Restoration Plan (ERP): Each borrower should have a written plan detailing how to restore its system in the event of large area or system-wide outage resulting from a major natural disaster or other cause. This plan should include how to contact emergency agencies, borrower management and other key personnel, material suppliers, contractors and equipment suppliers, other utilities, and any others who might need to be contacted in an emergency. It should also include recovery from loss of power to the headquarters, key offices, and/or operation center facilities. It should be readily accessible at all times by appropriate personnel, and under any and all circumstances. RUS Guide 1730B-2 contains the procedures for developing an ERP.

c. System Ratings: RUS Form 300, Review Rating Summary, includes a numerical rating system as follows:

0: Unsatisfactory – no records

1: Unsatisfactory – corrective action needed

2: Acceptable, but could be improved – see attached recommendations

3: Satisfactory – no additional action required at this time

N/A: Not Applicable

Exhibit A provides a guide for the conditions normally needed to justify a rating of 3 for each of the items on RUS Form 300. The explanatory notes section of RUS Form 300

should include a list of all items rated as unsatisfactory (ratings 0 or 1) along with comments indicating the action or implementation that is proposed. This is in addition to the Corrective Action Plan (CAP) required by 7 CFR 1730. Additional expenditures required for deferred maintenance should be indicated in the O&M Budgets, Part IV of RUS Form 300. These may be distributed over a period of two or three years as indicated on the form.

3. Review and Evaluation of O&M Practices by RUS

a. RUS will conduct a periodic review and evaluation of each borrower's O&M programs and practices. The purpose of this review is to assess loan security and to determine borrower compliance with RUS policy as outlined in Part 7 CFR 1730.

b. The General Field Representative (GFR) is responsible, within the GFR's assigned territory, for initiating and conducting a periodic review and evaluation of each borrower's O&M programs, practices, and records. This review and evaluation is normally done at least once every three years.

c. The GFR may review and evaluate facilities as well as records, and may also observe construction and maintenance work in the field. Key borrower personnel responsible for these facilities should accompany the GFR during such reviews.

d. If adequate information is available, the GFR will complete the review and evaluation and consult with the borrower regarding its programs and records for operation, maintenance, and system improvements. The GFR's signature on the Form 300 signifies concurrence with the borrower's analysis, ratings, and explanatory notes unless indicated otherwise.

e. If adequate information is not available, the GFR's review and evaluation will be deferred until the borrower has remedied the deficiencies identified by the GFR.

f. Upon completion of the O&M review and evaluation, the GFR will communicate his/her findings to the borrower verbally (exit interview), and in writing.

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EXHIBIT A

RUS FORM 300 RATING GUIDE

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

PART I - TRANSMISSION and DISTRIBUTION FACILITIES

1. Substations (Transmission and Distribution)

a. Safety, Clearance Code Compliance: No known violations of RUS, or NESC requirements are present in any substation, including clearances, grounding, and separations. All substations are accessible by authorized personnel only. Operating manual and one-line diagram are available for each substation. Appropriate safety equipment and operational tools are serviceable and available on site.

b. Physical Condition – Structure, Major Equipment, and Appearance: Utility is able to present records that reflect rare instances of rust, weeds, dangerous insects, and bird nesting exist; only minor material associated with maintenance of the substation equipment are stored in yard; no leaks, no temporary bus or grounding being used on an ongoing basis; no debris inside or around the substation; no openings under fence greater than three inches (76 mm); and no broken insulators exist. Power transformers are properly fault-protected. Circuits, phases, and airbreak switch handles are properly identified.

c. Inspection Records of Each Substation: Written monthly inspection reports are completed and reviewed by responsible personnel.

1. Infrared inspection of all connectors, arrestors and other applicable apparatus as recommended by manufacturer;

2. Dielectric, dissolved gas, and interfacial tension (IFT) tests of oil-filled equipment performed as recommended by manufacturer;

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

3. Annual Power factor tests of all applicable equipment;

4. Protective relays are functionally tested annually. Additional tests may be required per regulatory and/or manufactures recommendations and acceptable industry practice.

d. Oil Spill Prevention: Oil spill prevention and mitigation plans are prepared and available for all substations. On-site oil containment systems are inspected and serviceable.

2. Transmission Lines

a. Vegetation and Line Maintenance: Borrower is responsible for having a documented Vegetation and Line Maintenance program compliant with RUS and industry standards. Documented inspections should be completed and reviewed by qualified personnel for all transmission lines at intervals consistent with accepted industry and local practices.

b. Right-of-Way (ROW) – Clearing, Erosion, Appearance, and Intrusions: A process is in place to identify and address uncontrolled erosion. Gates or gaps exist at all fence crossings as necessary for proper access. Structures and lines are not impacted by untrimmed ROW. Structures are generally accessible by service vehicles.

1. Floor Maintenance: All transmission ROW floors should be maintained either mechanically or by herbicide to allow for access and prevention of grow-ins.

2. Danger Trees: All transmission ROWs should be patrolled to identify trees that may cause an outage. A process should be in place to document such trees' locations and provide for their immediate removal.

3. Side Trimming: All transmission line ROW should be trimmed as needed. Appropriate techniques should be used based on terrain and type of vegetation.

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

c. Physical Condition – Structure, Conductor, and Guying: All structures are plumb and all guys taut. Conductors are serviceable with infrequent damage, few splices, and are properly sagged. A process is in place to identify and repair broken insulators, crossarms, and overvoltage-protection devices, as well as unauthorized attachments and encroachments. Essentially all structures are numbered. Poles, structures and hardware have minimal structural defects and corrosion. Structures and attachments conform to NESC requirements. Wood poles should be inspected at regular intervals to prevent decay and are replaced when less than 67% of the original required strength is remaining.

d. Line Patrol Program and Records: All overhead lines (including those on private ROW) are patrolled at intervals of at least once per year. Records of line patrol activity showing dates and locations where line patrol has been performed and any apparent deficiencies are readily available in summary form. Line patrol is defined as simple visual inspection, of applicable electrical equipment and structures, which is designed to identify obvious structural problems and potential hazards. Records are maintained and line patrol deficiencies are corrected in a timely manner.

e. Pole Inspection Program and Records: Above and below ground pole inspections are performed on a cycle based upon decay zone, or as experience as shown to be necessary, using experienced inspectors and accepted industry practices. Records of all poles inspected, treated, rejected and changed out readily available in summary form.

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

3. Distribution Lines - Overhead

a. Pole Inspection - Program and Records: Above and below ground pole inspections are performed on a cycle based upon decay zone, or as experience as shown to be necessary, using experienced inspectors. Records of all poles inspected, treated, rejected and changed out readily available in summary form.

b. Line Patrol Program and Records - All overhead lines are patrolled at intervals of three years. Records of line patrol activity showing dates and locations where line patrol has been performed and any apparent deficiencies are readily available in summary form. Line patrol is defined as a simple visual inspection, of applicable electrical equipment, clearances, structures, and joint attachments so as to identify obvious problems and potential hazards. Records are maintained for deficiencies which are to be corrected in a timely manner.

c. Compliance with Safety Codes – Clearances: All facilities staked prior to construction are done by personnel familiar with NESC requirements. Conditions requiring greater clearances identified in line patrols are addressed as soon as practical.

Compliance with Safety Codes – Foreign Structures: Utility has policy and practice of promptly remedying foreign structures that conflict with primary lines upon observation.

Compliance with Safety Codes – Attachments: All overhead attachments meet NESC separation and clearance requirements. Up-to-date joint-use and pole rental agreements are in effect. Utility has policy and practice of periodic attachment inspection. Unauthorized attachments and violations of the NESC are promptly remedied.

d. Observed Physical Condition from Field Checking – Right-of-Way: Structures and lines are not impacted by ROW vegetation and structures. ROW vegetation trimming cycles to be dictated by local conditions. Clearance issues with structures are remediated as soon as possible.

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

Observed Physical Condition from Field Checking – Other: Rare instances of leaning poles, slack guys, broken grounds, damaged or corroded conductors, excessive splices, loose hardware, and/or superfluous material on structures exist. No broken crossarms or insulators exist, and no pole steps are on wood poles. Installation of miscellaneous distribution equipment meets NESC requirements. Neutral conductor is properly identified when located on crossarm. Dated pole inspection tags are installed on all inspected wood poles. These dated pole inspection tags can either be physical or electronic.

4. Distribution - Underground Cable

a. Grounding and Corrosion Control: Ground rods are properly installed at each transformer, in addition to a minimum of four per mile (1.6 km), not including grounds at individual services, in accordance with the NESC. Appropriate and timely actions are taken to correct any unsatisfactory conditions.

b. Surface Grading, Appearance: Rare instances of earth settling, which could create hazards to the general public, exist, and timely action is taken to correct any deficiency.

c. Riser Poles – Hazards, Guying, Condition: Cut-outs are mounted per RUS requirements. Riser cable is covered with conduit to within four feet (1.2m) of the bottom of the potheads. Damaged conduits are promptly replaced or repaired. Adequate overvoltage protection is installed.

5. Distribution Line Equipment: Conditions and Records

a. Voltage Regulators: Voltage regulators are inspected and maintained in accordance with the manufacturer's recommendations, accepted industry practices and experience, and as local conditions dictate. Knowledge of and compliance with EPA requirements with respect to PCB-contaminated oil and equipment. Dielectric, dissolved gas, and IFT tests of oil-filled equipment are performed every five years or at intervals consistent with

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

accepted industry practices, vendor recommendations, borrower experience, and local conditions or events such as storms, faults, and related equipment failure.

b. Sectionalizing Equipment: Oil circuit reclosers (OCRs) and breakers are inspected and maintained in accordance with the manufacturer's recommended timetable. Records reflect inspection results, maintenance performed, and date. Protective relaying controls are tested at periodic times as considered good industry practice or every three years.

c. Distribution Transformers: Complete records are kept as to size, location, and date installed. Knowledge of and compliance with EPA requirements with respect to PCB-contaminated oil and equipment. Transformer loading analysis is performed periodically as needed.

d. Pad-Mounted Equipment – Safety – Locking, Dead Front, Barriers: All pad-mount enclosures meet RUS dead-front requirements (secondary barriers, recessed penta-head nut, and separate pad-lock). Grounding is ensured in accordance with RUS and NESC requirements. "Danger" signs are installed inside all enclosures and "Warning" signs are installed on the exterior in accordance with ANSI Z535.

e. Pad-Mounted Equipment – Appearance – Settlement, Condition: Rare instances of leaning or undermined enclosures exist. Prompt action is taken to correct deficiencies. Equipment exterior and interior surfaces are relatively free of rust and corrosion and are still intact (i.e., no holes).

f. Watt-hour and Demand Meter Reading and Testing: All meters are tested in accordance with state regulations (where applicable) or ANSI C12.1. PT, CT, and demand meters are generally tested on at least a three-year cycle. Complete records are kept as to size, location, and date installed.

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

PART II - OPERATION AND MAINTENANCE

6. Line Maintenance and Work Order Procedures

a. Work Planning and Scheduling: All lines are staked prior to construction by personnel familiar with NESC requirements. Work order inspections are performed in accordance with 7 CFR 1724, Electric Engineering, Architectural Services and Design Policies and Procedures (i.e., within six months of completion of construction). Utility shall document that all remedial work has been completed and provide notice to any contracted work order inspection entities of the same. Construction Work Plan projects are completed in time to meet load-level requirements. New service connections are completed in reasonable timeframes.

b. Work Backlogs – Right-of-Way Maintenance: Adequate resources are provided to address re-clearing on timely basis. ROW re-trimming cycles to be dictated by local conditions.

c. Work Backlogs – Poles: All reject poles are replaced within six months of inspection. "Danger" and "Hazard" poles are replaced as soon as possible.

d. Work Backlogs – Idle Services - Retirement of: Policy and procedures are in place to address retirement of idle services so ratio of idle services to total is less than 10% unless specific local conditions dictate otherwise.

e. Work Backlogs – Other: Job orders from line inspections are completed in reasonable timeframes.

7. Service Interruptions

a. System Average Interruption Duration Index (SAIDI): Service continuity objectives are described in Section 5 of RUS Bulletin 1730A-119. For Form 300, Part II, 7(a), the “All

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

Other SAIDI" classification will be the primary category for evaluation. The current guideline is an "All Other SAIDI" of 200 minutes or less for a "Satisfactory" rating of 3.

b. Emergency Restoration Plan: Emergency restoration plan is readily available and covers multiple scenarios, including loss of power to the headquarters, key offices, and/or operations centers.

8. Power Quality

General Freedom from Complaints: Minimal complaints are received with respect to television and radio interference, voltage flicker, neutral-to-earth voltage, harmonics, and EMF. Complaints are generally resolved quickly and effectively. Summary of complaints is maintained and analyzed periodically.

9. Loading and Load Balance

a. Coop shall provide evidence of transformer load studies that identify underutilized capacity or overloaded transformers. Transformers consistently loaded to 50% or less of nameplate capacity, or over 140% of nameplate capacity, should be considered for replacement.

b. Load Control Apparatus: Have records of individual controllers showing location, type of load being controlled, and any maintenance. Load control results are summarized.

c. Substation and Feeder Loading: All feeders are balanced among phases to within 20% during peak loads.

10. Maps and Plant Records

a. Operating Maps – Accurate and Up-to-Date: Consumers are identifiable by location with a set of maps carried by all service personnel. Maps depict roads, grid lines, waterways, railroads, and other landmarks necessary to locate consumers. Maps are of a functional

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

size and permit location of consumers irrespective of date of service. Detail maps are current and up-to-date, generally 1 year old or less.

b. Circuit Diagrams: Current and up-to-date maps depicting a multiple line layout of distribution facilities of the utility are kept at the utility's office. The locations and sizes of substations, distribution lines, line regulators, reclosers, capacitors, and substation boundaries are clearly shown. Primary voltage drops are indicated at the ends of primary feeder lines. All transmission lines within the service territory are depicted and identified as to voltage and ownership.

c. Staking Sheets: Staking sheets are prepared for projects prior to construction. The sketch and construction units are consistent and sheets shall provide sufficient engineering detail to note all aspects of construction and unit specification, including but not limited to orientation, geographic location, operating voltage, ruling span, and special notes. Final staking sheets are consistent with the "as-built" conditions.

d. Electronic Maps: Operational electronic maps or other field force automation applications may contain the required aforementioned information in user accessible attribute form.

11. Oil Storage & Handling

Records of oil testing, storage, spills, and spill prevention are present and maintained in accordance with federal requirements. Where applicable, a current spill prevention containment and control (SPCC) plan shall be in place and followed.

12. Avian Protection and Response Plan

Records of system improvements for purposes of avian protection and responses to avian contacts with utility plant are present and maintained in accordance with federal requirements.

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

PART III - ENGINEERING

13. System Load Conditions and Losses

a. Annual System Losses: System losses are appropriate for the conditions encountered. Reasonable efforts are made to reduce system losses.

b. Annual Load Factor: Load factor is appropriate for the conditions encountered. Reasonable efforts made to improve load factor, where possible.

c. Power Factor at Monthly Peak: Each distribution substation maintains a power factor as required by the wholesale power supplier.

14. Voltage Conditions

Substation Transformer Output Voltage Spread: All substations include automatic voltage regulators or voltage regulating transformers. Each substation has continuous voltage recording, which is monitored monthly. Regulated substation output voltage and line regulators are maintained so Range A service voltage per RUS Bulletin 1724D-113 is provided to all consumers.

15. Load Studies and Planning

a. Long Range Engineering Plan: System planning study is valid and meets the requirements of 7 CFR 1710, can be used as a guide for preparing the next Construction Work Plan, and is prepared in accordance with RUS Bulletin 1724D-101A.

b. Construction Work Plan: Work Plan is up-to-date, meets the requirements of 7 CFR 1710, and is prepared in accordance with RUS Bulletin 1724D-101B.

CONDITIONS NORMALLY NEEDED TO JUSTIFY A RATING OF 3

c. Sectionalizing Study: System sectionalizing is reviewed and updated as needed concurrently with each Construction Work Plan and when significant changes occur in fault current conditions in accordance with RUS Bulletin 1724E-102.

d. Load Data for Engineering Studies: An integrated database automatically assigns consumers and their load to specific geographical locations that are associated with specific distribution line sections. Data is sufficiently accurate so the difference between the calculated and measured substation kW is less than 5%.

e. Power Requirements Study: Power Requirements Study is current and completed in compliance with the requirements stated in 7 CFR 1710.

PART IV - OPERATION AND MAINTENANCE BUDGETS

16. Budgeting

Adequacy of Budgets For Needed Work: Utility prepares an annual O&M budget with specific item quantities and dollars prior to the beginning of each year for each department. The O&M budget is broken down to show each program, the quantities of work to be accomplished and the time during the year when the proposed work is to be performed.

17. Date discussed with Board of Directors

Date that budget was discussed with the Board of Directors.

Print Dt/Tm:
03/16/2017

MISCELLANEOUS SERVICE ORDER

SERVICE MAP LOCATION:

Account: 100 SO Nbr: 22320305 Service: Electric Service W/O#:
Customer Nbr: 1 Srv Loc Nbr: 1 Provider: Cycle: 1

Taken By: crystal Date Taken: 08/08/2014 Needed Before: 8/8/14 12:00 am

Home Phone: NONE LISTED
Work Phone:
Mobile Phone:

CUSTOMER #1

Service Address:

Service Desc:
Subdivision:
Service: OH Block: Lot:
Line Srv Area: District:
Equip Map Loc:
Substation: 17 Feeder: 2 Line Sect:
County: City: NONE

Mailing Address:

Assigned To Assigned Dt Task

****EQUIPMENT TO BE SERVICED****

Equipment Type Activity Equipment Nbr Position Nbr Service Map Location

Meter # Secondary Rate Mult Dials Lock Ring LV Rdg LVR Date KWH Rdg KW Rdg Date

Trans # Secondary Size Phase Bank # Seq# Load Mgt Serial # Rate Cd LM Stat Load Type Stat Rem

Device # Type Description Status Map Location Con/Repair/Dis/Rem

AMR Type: Form #:

General Comments:
LINE MAINTENANCE / LUCKY SUB -EAST (S-8, F-3)

Service Comments:
*8/5/14
POLE TOP HARDWARE - 3
RETIED NEUTRAL - 11
ARRESTOR - 2
RETIED PHASE - 1
CHG INSULATOR - 1 JASON

Handheld Notes:

Assessment/Field Comments:

# of Prints: 1

Job Completed: By:_____ Date:_____ On Computer: By_____ Date_____

/report/46135/rptcustom/cis/SO_MISCELLANEOUS_46135.x Service Map Location:

EXHIBIT 19

Print Dt/Tm:

03/16/2017 7:49:07 AM

MISCELLANEOUS SERVICE ORDER

SERVICE MAP LOCATION: _____

Account: 100 **SO Nbr:** 22319954 **Service:** Electric Service **W/O#:**

Customer Nbr: 1 **Srv Loc Nbr:** 1 **Provider:** **Cycle:** 1

Taken By: crystal **Date Taken:** 07/14/2014 **Needed Before:** 7/14/14 12:00 am

Home Phone: NONE LISTED
Work Phone:
Mobile Phone:

CUSTOMER #1

Service Address:

Service Desc:
Subdivision:
Service: OH **Block:** **Lot:**
Line Srv Area: **District:**
Equip Map Loc:
Substation: 17 **Feeder:** 2 **Line Sect:**
County: **City:** NONE

Mailing Address:

Assigned To	Assigned Dt	Task

****EQUIPMENT TO BE SERVICED****

Equipment Type	Activity	Equipment Nbr	Position Nbr	Service Map Location

Meter #	Secondary	Rate	Mult	Dials	Lock Ring	LV Rdg	LVR Date	KWH Rdg	KW Rdg	Date

Trans #	Secondary	Size	Phase	Bank #	Seq#	Load Mgt Serial #	Rate Cd	LM Stat	Load Type	Stat	Rem

Device #	Type	Description	Status	Map Location	Con/Repair/Dis/Rem

AMR Type: **Form #:**

General Comments:
LINE MAINTENANCE / SUB 8, F-3 / EAST CIRCUIT LUCKY SUB

Service Comments:
*6/13/14
BRACE - 8
GROUND - 5
ARM HARDWARE - 14
RETIED NEUTRAL - 14
CHG INSULATOR - 1
CHG X-ARM PIN - 1
REPAIR - 5 JASON

Handheld Notes:

Assessment/Field Comments:

_____

_____

_____

# of Prints: 1

Job Completed: By:_____ Date:_____ **On Computer:** By_____ Date_____

/report/46135/rptcustom/cis/SO_MISCELLANEOUS_46135.x **Service Map Location:**

Print Dt/Tm:
03/16/2017

MISCELLANEOUS SERVICE ORDER

SERVICE MAP LOCATION:

Account: 100 SO Nbr: 22319955 Service: Electric Service W/O#:
Customer Nbr: 1 Srv Loc Nbr: 1 Provider: Cycle: 1

Taken By: crystal Date Taken: 07/14/2014 Needed Before: 7/14/14 12:00 am

Home Phone: NONE LISTED
Work Phone:
Mobile Phone:

CUSTOMER #1

Service Address:

Service Desc:
Subdivision:
Service: OH Block: Lot:
Line Srv Area: District:
Equip Map Loc:
Substation: 17 Feeder: 2 Line Sect:
County: City: NONE

Mailing Address:

Assigned To Assigned Dt Task

****EQUIPMENT TO BE SERVICED****

Equipment Type Activity Equipment Nbr Position Nbr Service Map Location

Meter # Secondary Rate Mult Dials Lock Ring LV Rdg LVR Date KWH Rdg KW Rdg Date

Trans # Secondary Size Phase Bank # Seq# Load Mgt Serial # Rate Cd LM Stat Load Type Stat Rem

Device # Type Description Status Map Location Con/Repair/Dis/Rem

AMR Type: Form #:

General Comments:
LINE MAINTENANCE EAST CIRCUIT OUT OF LUCKY (S-8, F-3)

Service Comments:
*6/6/14
GROUND 12
RETIE NEUTRAL - 6
PULL GUY - 1
CHG X-ARM - 1
RETIE PHASE - 1
ARM HARDWARE - 12 JASON

Handheld Notes:

Assessment/Field Comments:

# of Prints: 1

Job Completed: By:_____ Date:_____ On Computer: By_____ Date_____

/report/46135/rptcustom/cis/SO_MISCELLANEOUS_46135.x Service Map Location:

Print Dt/Tm:
03/16/2017

MISCELLANEOUS SERVICE ORDER

SERVICE MAP LOCATION: _____

Account: 100 **SO Nbr:** 22319958 **Service:** Electric Service **W/O#:**
Customer Nbr: 1 **Srv Loc Nbr:** 1 **Provider:** **Cycle:** 1

Taken By: crystal **Date Taken:** 07/14/2014 **Needed Before:** 7/14/14 12:00 am

Home Phone: NONE LISTED
Work Phone:
Mobile Phone:

CUSTOMER #1
Service Address:

Service Desc:
Subdivision:
Service: OH **Block:** **Lot:**
Line Srv Area: **District:**
Equip Map Loc:
Substation: 17 **Feeder:** 2 **Line Sect:**
County: **City:** NONE

Mailing Address:

Assigned To	Assigned Dt	Task

****EQUIPMENT TO BE SERVICED****

Equipment Type	Activity	Equipment Nbr	Position Nbr	Service Map Location

Meter #	Secondary	Rate	Mult	Dials	Lock Ring	LV Rdg	LVR Date	KWH Rdg	KW Rdg	Date

Trans #	Secondary	Size	Phase	Bank #	Seq#	Load Mgt Serial #	Rate Cd	LM Stat	Load Type	Stat	Rem

Device #	Type	Description	Status	Map Location	Con/Repair/Dis/Rem

AMR Type: **Form #:**

General Comments:
LINE MAINTENANCE / EAST CIRCUIT OF LUCKY (S- 8 , F- 3)

Service Comments:
*6/2/14
BRACE - 3
ARM HARDWARE- 17
CHG X-ARM - 1
RETIE PHASE - 3
GROUND - 6 JASON

Handheld Notes:

Assessment/Field Comments:

_____

_____

_____

# of Prints: 1

Job Completed: By:_____ Date:_____ **On Computer:** By_____ Date_____

/report/46135/rptcustom/cis/SO_MISCELLANEOUS_46135.x **Service Map Location:**

Print Dt/Tm:
03/16/2017

MISCELLANEOUS SERVICE ORDER

SERVICE MAP LOCATION: _____

Account: 100 **SO Nbr:** 22319959 **Service:** Electric Service **W/O#:**
Customer Nbr: 1 **Srv Loc Nbr:** 1 **Provider:** **Cycle:** 1

Taken By: crystal **Date Taken:** 07/14/2014 **Needed Before:** 7/14/14 12:00 am

Home Phone: NONE LISTED
Work Phone:
Mobile Phone:

CUSTOMER #1
Service Address:

Service Desc:
Subdivision:
Service: OH **Block:** **Lot:**
Line Srv Area: **District:**
Equip Map Loc: NPEC
Substation: 17 **Feeder:** 2 **Line Sect:**
County: **City:** NONE

Mailing Address:

Assigned To	Assigned Dt	Task

****EQUIPMENT TO BE SERVICED****

Equipment Type	Activity	Equipment Nbr	Position Nbr	Service Map Location

Meter #	Secondary	Rate	Mult	Dials	Lock Ring	LV Rdg	LVR Date	KWH Rdg	KW Rdg	Date

Trans #	Secondary	Size	Phase	Bank #	Seq#	Load Mgt Serial #	Rate Cd	LM Stat	Load Type	Stat	Rem

Device #	Type	Description	Status	Map Location	Con/Repair/Dis/Rem

AMR Type: **Form #:**

General Comments:
LINE MAINTENANCE /EAST CIRCUIT LUCKY (S- 8, F- 3)

Service Comments:
*6/3/14
GROUND - 9
RETIE NEUTRAL - 5
RETIE PHASE - 1
CHG INSULATOR - 1
ARM HARDWARE - 7
BRACE - 2
PULL GUY - 1 JASON

Handheld Notes:

Assessment/Field Comments:

_____

_____

_____

# of Prints: 1

Job Completed: By:_____ Date:_____ **On Computer:** By_____ Date_____
/report/46135/rptcustom/cis/SO_MISCELLANEOUS_46135.x **Service Map Location:**


EXHIBIT 20


EXHIBIT 21


EXHIBIT 22

A publication of the
National Wildfire Coordinating Group

Guide to Wildland Fire Origin and Cause Determination

PMS 412 April 2016

NFES 1874

EXHIBIT 23

Guide to Wildland Fire Origin and Cause Determination

April 2016
PMS 412
NFES 1874

Sponsored for National Wildfire Coordinating Group (NWCG) publication by the Communication, Education & Prevention Committee. Prepared and maintained by the Wildland Fire Investigation Subcommittee.

Questions regarding the content of this product should be directed to the members listed at http://www.nwcg.gov/. Questions and comments may also be emailed to BLM_FA_NWCG_Products@blm.gov.

This product is available electronically at http://www.nwcg.gov/. Printed copies may be ordered from the Great Basin Cache, National Interagency Fire Center, Boise ID. For ordering procedures and costs, please refer to the annual NFES Catalog Part 2: Publications posted at http://www.nwcg.gov/.

Previous editions: 1978, 2005.

Preface

The *Guide to Wildland Fire Origin and Cause Determination* is designed for use in the field as a guide for wildland fire investigators.

Accurate wildland fire origin and cause determination is an essential first step in a successful fire investigation. Proper investigative procedures which occur during initial attack can more accurately pinpoint fire causes and preserve valuable evidence that might be destroyed by suppression activities. If a fire is human-caused, the protective measures described in the guide can preserve evidence that may lead to effective and fair administrative, civil, or criminal actions.

The investigation should start at the time a fire is reported or discovered. First responders play an important role in protecting evidence, so it is important for the wildland fire investigator to help train first responders to identify and protect the *General Origin Area* of the fire. Wildland fire investigators should impress upon firefighters, law enforcement officers and other first responders that the preliminary protection of the General origin area and any associated evidence on any wildfire is their responsibility, and emphasize to them that they are the most important link in the subsequent origin and cause determination. Not only is it important for the first responders to recognize the need for an accurate origin and cause determination, it is important that they understand how their actions, both during and following suppression, can enable a qualified wildland fire investigator to accurately determine the origin and cause.

Laws are not cited or referenced in the field guide. The format is designed so that agencies, organizations, or individuals may add applicable rules, regulation or statutes if they so desire. Specific federal, state, and local laws and regulations give direction with respect to wildland fire investigations and the legislative authority to investigate wildland fires.

Safety

Fire scenes may be dangerous. Wildland fire investigators have a duty to exercise due caution during their investigations. The wildland fire investigator should abide by safety-related policies and procedures established by their agency, federal, state, provincial and local governments, or industry.

Investigating the Scene

Fire scene examinations *should not be undertaken alone*. At least a minimum of two individuals should be present for safety. If it is impossible to be accompanied by a second wildland fire investigator, a firefighter or other suitable person should accompany the lead wildland fire investigator. It is critical that the wildland fire investigator have communications with the suppression forces on the incident. Use of cellular phones is NOT recommended as an adequate substitute for radio communications as cellular phones frequently will not work in remote or rural areas, and may be difficult to use in emergency or high stress situations.

Hazards

Safety is the highest priority on wildland fires. Investigating wildland fires involves specific hazards that must be considered while on the fire scene. The wildland fire investigator must be aware of areas where the fire may still be burning or where fire has been extinguished but could become active. An escape route must always be present and continually evaluated as fire conditions change. A rekindle and availability of fuels, along with a change in the wind direction may create hazards as extreme as a crown fire, which may block the previously planned escape route.

Underground burning in a smoldering stage can erupt into flaming combustion if the fire burns to the surface or if the top layer of soil is disturbed exposing the heated fuel to air. Also, a danger exists if the wildland fire investigator steps into an area burned out from below such as in peat or a stump hole.

Wildland fire suppression operations may also present safety hazards to the wildland fire investigators. Operation of aircraft dropping water or retardant, heavy equipment, tree felling, and suppression tactics such as burning out or backfiring unburned fuel in and around the origin area are all potential hazards. Investigative personnel must contact the appropriate incident personnel and coordinate their planned investigative activities with them.

Other associated hazards are falling debris from charred, fire-weakened trees and limbs. Additional hazards may be present in sloped terrain. Logs

or rocks can be loosened from their location as a result of the fire, from suppression operations, or from the actions of a wildland fire investigator. When the root structure is destroyed by fire, soil may begin to lose its stability, which in turn can cause slides that may injure the wildland fire investigator or destroy evidence.

Stinging or biting insects such as bees or scorpions can cause painful injury and in some instances life threatening emergencies. Poisonous snakes can survive the passage of a wildfire and should be watched for.

Wildland fire investigators should always be alert to the possibility that hazardous materials (HAZMAT) is sometimes found in or near the origin of wildland fires. If HAZMAT is located or suspected, the wildland fire investigators should immediately take appropriate action to protect themselves and others, and notify the Incident Commander.

Power lines, railroads, and roadside fires present obvious hazards. Wildland fire investigators should take appropriate precautions.

The weather can also cause or contribute to hazards. Rain can create slippery footing. Lightning may be a concern as well. During lightning conditions, follow established safety procedures. Hot and dry temperatures and reduced shade due to the fire passage can present conditions which may subject the wildland fire investigator to heat stress.

Personal Protective Equipment

The use of personal protective equipment (PPE) such as protective clothing, safety equipment and law enforcement defensive equipment will vary depending on the circumstances. The wildland fire investigator should comply with agency or industry requirements for personal protective equipment applicable to wildland firefighting.

Chapter 1A - Fire Behavior

Principles of Fire Spread

Determining the origin, the cause, how the ignition source came into contact with the materials first ignited (ignition sequence), and identifying the responsible party, if any, are the fundamental purposes of a wildland fire investigation. This is generally done by employing a systematic method of investigation. Fires burn according to scientific principles and the evidence of a fire's progress takes the form of fire pattern indicators.

A fire pattern indicator is a physical object that displays changes (fire effects) from exposure to heat, flame, and combustion byproducts. An accurate analysis of individual fire direction indicators can reveal fire progression at that precise location and forms a portion of the overall fire pattern. Analyzing the relationship of the majority of individual fire pattern indicators reveals the overall fire pattern. This in turn will reveal overall fire progression.

For a wildfire to occur an ignition source must contact the host fuel, materials first ignited, and have sufficient heat over a sufficient duration of time to raise it to its ignition temperature. The smallest area that the wildland fire investigator can define, within the Specific Origin Area, using the available fire pattern indicators, is referred to as the *Ignition Area*. The ignition area may include indications of smoldering combustion or flaming combustion and evidence of each should be noted as it pertains to the ignition sequence. Any physical remains of the ignition source will most likely be located within this area, if it has not been removed, completely consumed, or destroyed by suppression efforts.

Fire Behavior Factors

Understanding the basic principles of fire behavior is critical for the wildland fire investigator. The ability to re-create the fire progression, based on knowledge of these principles will greatly assist the wildland fire investigator in identifying and correctly interpreting fire pattern indicators and overall burn patterns. It is strongly recommended that a wildland fire investigator take additional training in the area of wildland fire behavior to enhance their understanding of these principles.

A wildland fire is influenced by three main elements. These are *weather, topography and fuels*. Each of these elements has multiple sub-elements. It is the combination of these elements that form the fire behavior context. Understanding how these elements interact and affect the formation of fire pattern indicators is crucial to properly interpreting a wildfire's burn pattern.

Weather: *Wind, temperature and relative humidity* are the three components that comprise weather.

Wind normally has the greatest effect of all the elements on fire spread and intensity. Wind speed and direction are important to the wildland fire investigator when determining both the origin of a fire and the potential ignition sources. Wind speed and direction can vary dramatically at ridge levels and above the canopy of the vegetation as compared to wind speeds and directions below the canopy, and particularly at the mid flame level and ground fuel level where most fires originate and initially burn.

Wind data from most automated weather stations is normally taken at the 20 foot level and in areas often cleared of vegetation, thus having no canopy to affect the speed and direction of the wind. Winds below the 20-foot level, below the canopy, can be reduced through friction loss, by as much or more than 90 percent by the canopy and other obstructions at mid-flame levels. Wind direction at mid flame level can be dramatically different than those indicated by the smoke column after the fire is established and on-site data should be taken as soon as possible after the ignition and compared to wind information taken at the 20-foot level. Further, air movement at the ground level is important when evaluating the potential for a smoldering ignition and transition to flaming combustion.

Fire moving with the wind generally burns faster than a fire backing into the wind. You will be able to observe the difference in the fire patterns and the amount of fuel consumed. After the fire reaches a certain size, it will begin to create its own wind and burn even faster than before. This may result in the creation of in-draft air flow into the main fire which may change the direction of the wind at the flanks and heel or may increase the pre-fire wind speeds in those areas. This in-draft influence may be present when the main fire plume (smoke column) establishes itself as dominant and is referred to as a plume-driven fire. Fires will generally spot in advance of the main fire in the direction the wind is blowing near the head and shoulders of the fire.

Weather patterns can change quickly. A switch in wind direction can substantially affect fire patterns. Winds are rarely steady out of one direction. Winds will typically swing in an arc around the general wind direction.

Relative humidity directly affects ignition probability and fire intensity. The relative humidity also controls fine dead fuel moisture, one-hour time-lag fuels less than ¼ inch in diameter. It is important to understand the lag time and relationship of fuel moisture content and the relative humidity. Fine fuels of less than ¼ inch in diameter respond fairly quickly to changes in the relative humidity while larger diameter fuels will take longer to gain and lose fuel moisture content, often lagging behind changes in the relative humidity. The wildland fire investigator should collect and consider the

changes in relative humidity prior to and after the ignition of a fire when determining the availability of certain fuels.

Temperature influences fire behavior by the drying and preheating effect it has on fuels. Areas exposed to, or shaded from the direct rays of the sun can produce different fuel temperatures and moisture content, thus both slope aspect and canopy cover should be noted during the investigation of a fire.

Like wind speeds, temperatures at ground level can be different from those readings taken from Remote Automated Weather Stations (RAWS) or by handheld instruments. This difference can be significantly higher, by as much as 40 ^{o}F (Fahrenheit).

Topography: Topography consists of *slope, aspect, and terrain*. Following wind, slope is the next greatest potential influence on the rate and direction of fire spread. Fires will burn faster uphill than downhill because of the preheating of the uphill fuels and the influence of daytime upslope and up-canyon winds. A fire backing downslope will normally move slower than a fire advancing upslope. Slope may also contribute to the propensity for hot debris to roll or slide downhill creating spot fires which may burn back uphill to the main fire.

Consideration of the aspect of the slope is also necessary. Generally, due to greater exposure to the sun and the subsequent solar heating, south-facing slopes exhibit higher intensity and more rapid rates of spread. The converse of this is true for fires in the southern hemisphere.

Terrain can also affect both intensity and rate of spread, particularly when there are either barriers or natural chimneys present. Barriers such as a log, bare dirt, or rocks, can cause a fire to slow down or even go out. Almost any barrier will at least lessen the intensity of the fire as it passes. Larger terrain features often cause wind eddies which can change the fire's direction, at least for short distances. Don't confuse the effect of a barrier's temporary change of a fire's direction with the actual direction the fire came from. Natural chimneys can increase wind velocity due to the channeling effect and accelerate fire spread and increase intensity substantially.

Fuels: Fuels are characterized by a variety of factors. These include vertical and horizontal arrangement, type, species, size and fuel moisture, and both live and dead. Fires will tend to ignite more easily and spread more rapidly in fine dead fuels with low moisture contents. Fuels that are most commonly associated with ignition area s are those that are characterized as having a high surface-to-volume ratio. These typically include dead grass, conifer needles, small twigs, duff, punky wood, and other similar fuel packages.

Wildland Fire Terminology

The following terms are recommended for use in wildland fire investigation. Each will be discussed in detail in the following pages.

- Fire Pattern Indicator.
- Fire Pattern.
- Fire Progression.
- Fire Pattern Indicator Vector.
- Advancing Fire.
- Backing Fire.
- Lateral Fire.
- Transition Zone.
- Macroscale Fire Pattern Indicator.
- Microscale Fire Pattern Indicator
- Indicator Cluster.
- Damage Differential/Compare and Contrast.
- Systematic Methodology.

Fire Pattern Indicator: A physical object that displays changes (fire effects) from exposure to heat, flame, and combustion byproducts. Accurate analysis can reveal fire progression at that precise location. A fire pattern indicator is a single component of the overall fire pattern.

Fire effects are the observable or measurable changes in or on a material as the result of a fire. The term *fire effects* has a similar but broader meaning in the context of prescribed fire (the physical, biological, and ecological impacts of fire on the environment), but in fire investigation it refers to the specific changes that are caused to a combustible or non-combustible object when it is exposed to heat, flame and/or the byproducts of combustion.

Fire pattern indicators that are in disagreement with the majority of indicators in an area used to be called *false indicators*, but they are not false, they simply represent fire progression at that precise point, which may not be reflective of overall fire progression, and therefore could be misleading if not interpreted within the overall fire progression and fire behavior context.

Fire Pattern: The visible or measurable physical changes formed by a fire effect or group of fire effects. This can be over a small area or it can include the overall pattern of fire spread as determined by the entirety of fire pattern indicators over a larger area. Analyzing the relationship of the majority of individual fire pattern indicators reveals the overall fire pattern. This, in turn, will reveal overall fire progression.

Fire Progression: The spread of fire from one location to another. Most fires start small, with smoldering or glowing ignitions. A fire will transition to flaming combustion under the right conditions and burn in all directions

until influenced by: wind, slope, fuel, suppression activity, or combination of these factors. Once influenced, the fire will progress outward in a direction influenced by these factors, with the most dominant factor(s) establishing the primary advancing direction. Vector areas (advancing, lateral, and backing) will become established.

Fire Pattern Indicator Vectors: A group of individual fire pattern indicators located near each other, which as a group reflect the fire spread vector within that area or the physical characteristics of a single fire pattern indicator that shows the direction of fire progression at that point (vector being the same as direction).

Fire pattern indicator vectors identify transition zones which are often subtle in nature.

There are three vector areas based on the dynamics of fire spread; Head, *advancing*; Flanks, *lateral*; and Heel, *backing*.

Advancing Fire Vector: The advancing fire vector is characterized by:

- Rapid fire spread.
  - Head fire.
  - Forward run.
- Higher intensity.
- Increased flame length.
- Macroscale fire pattern indicators.
- More damage when compared with backing and lateral areas.

Figure 1. Example of advancing fire vector.

Backing Fire Vector. The backing fire vector is characterized by:

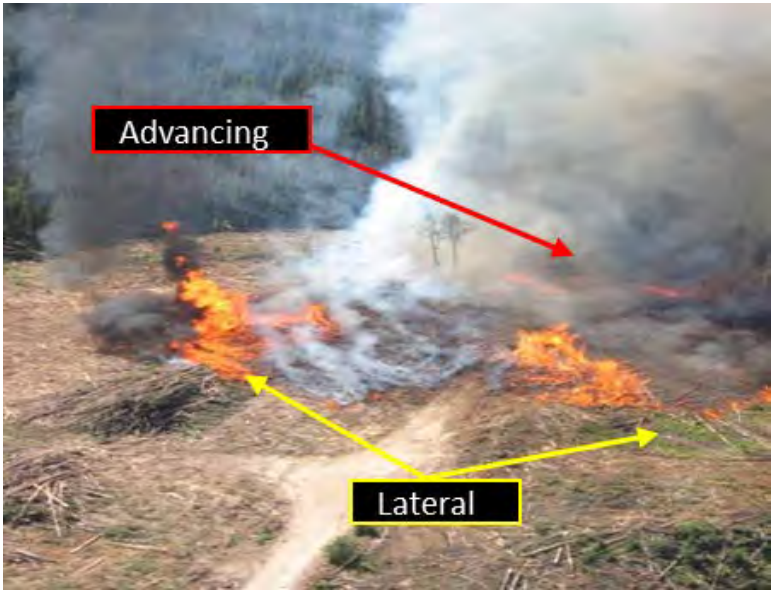
- Slower rate of spread.
  - Against wind.
  - Down slope.
- Lower intensity.
- Lower flame length.
- Less damage when compared with advancing and lateral areas.
- Microscale fire pattern indicators.

Figure 2. Example of backing fire vector.

Lateral Fire Vector. The lateral fire vector is characterized by:

- Rate of spread and intensity between advancing and backing.
  - Flank fire.
  - Spread lateral to main fire.
- Indicators can have characteristics of backing or advancing, depending on fire behavior circumstances.

Figure 3. Example of lateral fire vector.



Lateral Fire Pattern Indicators

- A higher intensity flank may leave indicators consistent with advancing fire spread:
  - Exhibits a more defined and narrower transition zone.
- A lower intensity flank may leave backing-type indicators:
  - Exhibits a more subtle and wider transition zone.
- Intensity on flanks may change with wind, slope, and fuels.

Flanks are defined by strips of unburned or partially burned fuel and their location is influenced by change in wind and slope.

Heat or Flame Exposure Lateral Fire Pattern Indicators

- Sooting, staining, and white ash deposits appear on the exposed side.
- Protection indicators will appear on the unexposed side.
- Generally 45 to 90 degree angle to the direction of advancing fire spread.

Exposed side is generally oriented towards the origin. Unexposed side generally oriented away from the origin.

Wind Influenced Lateral Fire Pattern Indicators

- Foliage freeze, grass stem, cupping, white ash deposits, and angle of char.
- Generally appear on the exposed side of the object.
- Usually aligned with advancing fire indicators:
  - May be at 45 degree angle to advancing spread.
- Grass stems are intensity dependent:
  - May fall into the burned area at 45 to 90 degree angle and remain on ground.
  - May be consumed completely.

Wind influenced lateral fire pattern indicators will align mostly with the direction the wind is blowing, up to about a 45 degree angle from the direction the main advancing fire is progressing. For example, foliage freeze will generally be in line with the wind direction in the advancing zones; grass stem indicators along the flanks will typically fall into the already burned lateral zone with the stem heads facing back to the origin area at an approximate 45 degree angle; angle of char on the flanks will present between direct alignment with the angle of char fire pattern indicators in the advancing zone and out to about a 45 degree angle to the main direction of the advancing zone. Cupping and white ash fire pattern indicators will be similar.

An exception is when high wind vortex flame wrap occurs.

Transition Zone

- Area of **directional** change based on variations in intensity.
  - Advancing to lateral.
  - Advancing to backing.
  - Backing to lateral.
- Change in appearance and characteristics of indicators.
- Transition zones may outline specific origin area.
- A key to accurately interpreting fire patterns is identifying transition zones.

Transition Zone Fuel Effect

Advancing fire will spread at different rates depending upon the type and availability of the fuels. A fire may spread very quickly under the influence of a moderate wind in dry grassy fuels. The same fire burning into a stand of timber may slow its rate of spread while the fire in the grassy area continues to spread. Once the fire in the timber burns past to the grassy fuels again, it will typically pick up its rate of spread.

These changes in the composition of the fuels are part of the fire behavior context that the wildland fire investigator must observe, understand, and take into account. Very few wildland fires burn in the same fuel conditions during their entire duration.

Transition Zone Wind Change Effect

During the duration of a fire, the wind direction may change many times. In actual practice, it is rare for there to be a constant wind direction. Typically, winds that are noted to be out of the south will actually vary in direction to one side of south or the other over short and long periods of time.

These changes in wind direction will affect the spread direction of the advancing fire and the transition zones. An example would be the wind switches to the right and the right lateral becomes the advancing fire vector, the left lateral fire vector becomes backing, and new laterals form around where the old advancing and backing areas were.

Transition Zone Spot-fire or Rolling Material Effect

If the wind picks up embers and carries them downwind, causing spot-fires ahead of main fire front, this will result in the formation of new transition zones which will interact with the main fire. Each spot fire behaves as a separate fire until they burn together or the main flaming front overtakes the spot fires.

Likewise, rolling material can cause fires to start below the main fire, forming new transition zones which will interact with the main fire. Each fire from rolling material behaves as a separate fire until they join with the main fire.

Fire Pattern Indicator Categories

There are 11 categories of fire pattern indicators. They are based on fire behavior and the materials the fire effects. Each category can exhibit any of the three vectors, advancing, lateral, or backing. The physical appearance will differ with the vector (direction of fire progression). The fire pattern indicators are also divided into two general classifications which are:

- Macroscale Fire Pattern Indicators.
- Microscale Fire Pattern Indicators.

Macroscale Fire Pattern Indicators: Usually associated with larger objects or areas and are easily visible from a distance. Macroscale fire pattern indicators are usually found in areas of higher fire intensity. Macroscale fire pattern indicators commonly define areas of advancing fire. Macroscale fire pattern indicators are key clues to identifying the general origin area of the fire.

Microscale Fire Pattern Indicators: Associated with smaller objects or areas, microscale fire pattern indicators may not be as easily observed from a distance. The importance of microscale fire pattern indicators increases with the proximity to the ignition area.

Because microscale fire pattern indicators are typically more subtle than macroscale indicators, these indicators generally need to be observed from a close up position (kneeling, squatting or hands and knees position), not from a standing position.

Fire Pattern Indicator Clusters: Indicator clusters are a group of fire pattern indicators within close proximity which contain fire effects which portray a consistent vector among them. Clusters are most reliable when a variety of fire pattern indicator categories are represented within the group or cluster.

Close proximity of fire pattern indicators within a cluster is relative based on the size of the fire pattern indicators, such as five trees in a cluster. The distance between the fire pattern indicators in a cluster draws closer as you near the ignition area. Macroscale clusters tend to have greater spacing than microscale clusters.

Damage Differential: Damage differential is one of the underlying principles that govern the interpretation of most fire pattern indicators.

Damage differential on individual fire pattern indicators is the change that occurs to combustible and non-combustible objects after interaction with fire. The principle of damage differential on individual fire pattern indicators is a matter of comparing and contrasting the damage to determine which side was exposed to the oncoming fire. In this respect, damage differential underlies the processes which form protection fire pattern indicators and others.

In viewing larger areas (V and U patterns), the principle of damage differential is used to compare and contrast areas of higher intensity burning, indicating advancing fire, to areas of moderate (lateral fire) or low (backing fire) intensity. Identifying large scale damage differential is part of the process of identifying the general origin area. Large scale damage differential should be confirmed through the observation of individual fire pattern indicators. The amount of change will be based on the relative fire intensities and exposure to the oncoming fire.

Possible characteristics to compare and contrast:

- Amount of charring.
- Amount of white ash.
- Degree of loss of material.
- Amount of sooting or staining.
- Height and type of foliage freezing.
- Degree and location of spalling.
- Height and type of angle of char.
- Location and extent of cupping.
- Location and relative extent of general fire damage over larger area.

The degree of material lost is applied to individual items. When comparing and contrasting damage differential, as far as possible it should be on a similar size of fuel, same category of indicator, and at separate locations.

General Principles of Fire Pattern Interpretation

The interpretation of fire pattern indicators is governed by general principles which have been found to be reliable and which the wildland fire investigator needs to apply while conducting their origin investigation. These general principles have been around for many years. First known documentation was by Bob Bourhill of the Oregon Dept. of Forestry (Bourhill, 1982). These principles have been further refined by subsequent testing and experience.

- **Base your interpretation on the majority of the fire pattern indicators within an indicator category.** Single fire pattern indicators reflect the fire direction at a precise point and may be unreliable in the context of overall fire progression.

- **Base your interpretation on the fire pattern indicators within a variety of categories.** Using as many of the 11 categories of fire pattern indicators as possible provides for more reliability. Employ a systematic method when selecting fire pattern indicators in an effort to include the greatest variety.

- **A single fire pattern indicator may be accurate within a 180° arc.** Fire does not burn in perfectly straight lines. Radical but brief

directional changes may occur. The actual progression of the fire is primarily based on the wind, fuels, and slope. Fire pattern indicators will align with the progression at the point of each indicator and reflect the direction of the fire at the time it passed that specific fire pattern indicator.

- **Interpret fire pattern indicators within the context of fire behavior principles.** Determine the fire behavior context through weather observations, topography, reliable witness information and reconstruction of probable fuel conditions. This should include consideration of both unburned fuels and burned remains. Check the observations by interviewing witnesses such as first responders and civilian witnesses.

- **Fire pattern indicators will usually become less pronounced as you approach the Ignition Area.** Most fires start small and with lower intensity. Following ignition, the fire will progress outward from the ignition area. The initial spread of the fire will be generally circular until the fire falls under the influence of wind, slope and fuels. Intensity usually increases as fire progresses outward from the ignition area. In this initial area of combustion, due to the lower intensity, most of the fire pattern indicators will be microscale and subtle.

  This area immediately surrounding the ignition area is called the Specific Origin Area. Because of the lower intensity associated with this area, it is often characterized by the presence of more unburned material, unlike a structure fire origin which is often the location of greatest damage. As the fire comes under the influence of the varying fire behavior factors, it will begin to spread with uneven intensities and rates. This area is referred to as *General Origin Area*. The fire will now exhibit different areas of progression but is often influenced by localized barriers and smaller changes in fuel availability.

- **Document the fire pattern indicators during your investigation.** Use directional flags, fire spread sketches, diagrams and photos to document the fire progression. The use of directional flags (discussed in detail in Chapter 5, Documentation) helps the wildland fire investigator to visually keep track of fire progression and provide a visual representation of that progression.

- **Work from the area of more intense burning to the area of less intense burning, following the fire's progression back to the ignition area**. As the fire spreads, it will create transition zones between these areas of progression. A key to accurately interpreting fire patterns is identifying transition zones. A transition zone is an area of directional change based on variations

in intensity. Transition zones may outline the specific origin area. These zones can be identified by the appearance of the fire pattern indicators and can be subtle in nature.

The initial transition zone may be hard to define. By starting the search for the ignition area where clear advancing fire pattern indicators are present in the form of more intense burning, the wildland fire investigator reduces the risk of prematurely entering the ignition area and damaging it. Macroscale indicators, witness statements, and the fire behavior context form the basis for establishing the initial search for the general origin area. Care should be taken to start far enough out in the higher intensity advancing fire area to account for the possibility of multiple ignitions and origins.

- **Avoid attempts to prematurely locate the Ignition Area.** Indicators become increasingly subtle the closer you get to the ignition area. Wildland fire investigators will need to pay closer attention to detail and take their time, and avoid the pressure to rush. Working the specific origin area and the ignition area is typically the dirtiest and most time consuming portion of the search for the origin of the fire. Wildland fire investigators should be especially disciplined in their work within these areas. Patience is the key.
- **Direction of fire travel will be influenced by obstacles.** The fluid movement of fire is similar to the fluid movement of water around obstacles. Physical objects in the path of the fire's spread will cause the fire to go around, through or over them and may result in loss of intensity and speed. Temporary direction change should be expected as the fire works its way around, through or over obstacles.
- **View and document fire pattern indicators from all sides as appropriate.** Some fire pattern indicators cannot be contrasted unless viewed from various angles. Documenting from only one side may give a *one-sided* viewpoint. Angle of char, protection, white ash, sooting, and staining may not be evident unless looked at from different angles. Photo-document contrasting views where appropriate.

Chapter 1B - Fire Behavior and Fire Patterns

As a fire progresses, it will leave visible marks of its passage on combustible and non-combustible objects in its path. These markings are called *fire pattern indicators*. A fire pattern indicator's vector, (direction of travel, for example, advancing, backing, lateral), can usually be determined by examining the appearance of the fire pattern indicator. When analyzed within the fire behavior context they will form distinct overall fire patterns. These fire patterns will identify areas of fire progression and the accompanying transition zones. Fire progression can then be traced back to the fire's ignition area.

General Reliability and Possible Exceptions

Indicators accurately reflect fire behavior at the particular place and time the fire passed, however the individual vector displayed may not be consistent with general fire progression. Wildland fire investigators must be familiar with the fire behavior conditions (fire behavior context) that may cause an indicator to be inconsistent with other indicators.

Fire pattern indicators may be misleading if not correctly interpreted. Certain circumstances occur creating possible exceptions that apply to most fire pattern indicator categories. Other circumstances may occur creating possible exceptions that only apply to a specific fire pattern indicator category. Reliability and exceptions that apply to most fire pattern indicator categories include: heavy or uneven fuel loading; long-term fire residence; high winds or directional changes; fire backing, downslope, against wind; high variation in sound and rotten fuel; fire pattern indicators that may have moved; and previous fires in the same area (reburns).

Fire pattern indicators should be tested to determine their reliability.

Assess indicators for reliability

- Fire pattern indicator consistent with:
  - Fire behavior context.
  - Other indicators within a nearby pattern cluster.
  - General known fire progression.
  - Eye witness observations.
  - Video or photo evidence.
- Did any of the circumstances that can create exceptions exist during the fire's initial stages?
  - Test the reliability of fire pattern indicators with these exceptions in mind.

Fire Pattern Indicator Categories

Fire pattern indicators are classified into 11 categories and will be discussed further in this chapter. These categories are based on how the fire pattern indicator is formed and the materials upon which they are found. A category can exhibit any one of the three fire vectors, depending on the direction of the fire's progress at that point. Many of these fire pattern indicators will be apparent on both large and small objects and fuels.

The 11 fire pattern indicator categories are:

1. Protection.
2. Grass Stem.
3. Freezing.
4. Angle of Char.
5. Spalling.
6. Curling.
7. Sooting.
8. Staining.
9. White Ash.
10. Cupping.
11. V or U Patterns.

1. Protection Fire Pattern Indicators

A non-combustible object or the fuel itself shields the unexposed side of a fuel from heat damage. Fuels will be unburned or exhibit less damage, less staining, less sooting, less white ash, on the side unexposed to the fires advance (Figures 4 and 5). Look for charring, staining, white ash and clean burn lines on exposed sides of fuels and non-combustible objects. Compare and contrast to the opposing sides of objects. Lift or remove objects to compare and contrast the damage and protection after photographing in place. Objects resting on top of the ground and surface fuels will protect the fuels on the side opposite the fires approach. Surface fuels on the exposed side will exhibit a clean burn line. Surface fuels on the protected side will appear ragged and uneven (Figures 6, 7, and 8).

Figure 4. Protection on a log.

Figure 5. Protection on a pinecone.

Figure 6. Picture of non-combustible object shielding fuel from heat damage.

Figure 9. Close-up picture of burned grass with protected burn lines.

Object shields fuels from heat and flame. Both combustible and non-combustible objects can provide shielding. The same object may shield itself on unexposed side.

General Reliability and Possible Exceptions - Protection

General Reliability: Protection accurately shows fire direction and is most reliable in low to moderate intensity fires.

Possible Exceptions: Pithy stalks: A vascular plant that has a usually continuous central internal strand of spongy tissue in the stem. Pithy stalks may be annual or perennial. Because the outer sheathing is very thin, it may burn through on the unexposed side due to vortex flame wrap, with the fire becoming embedded in the soft, porous tissue. This may cause more damage on the unexposed side of the stem.

Suspended fuels: Limbs and tree trunks may be suspended by other fuels or objects. Gaps between the fuel and the ground causes vortex flame wrap on the unexposed side of the object, creating more damage and leaving

Figure 12. Example of microscale protection on smaller object that can be used to validate macroscale patterns.

Protection – Backing fire pattern indicators.

Backing fire microscale protection fire pattern indicators are generally on the more protected and smaller fuels and objects due to lower intensity of fire in the backing area.

Protection – Lateral fire pattern indicators.

Lateral fire macroscale protection fire pattern indicators generally exhibit more damage on the side closest to the advancing fire front and presents at 45- 90 degree angle to advancing fire progression. Protection is more noticeable when contrasted against advancing fire area.

2. Grass Stem Fire Pattern Indicators

The charred remains of grass stems left in the fire's wake will have different appearances dependent upon the direction of the fire's travel and intensity. In advancing fire areas, the flames will attack the stem from the top and burn them to ground level, completely consuming all but the very base of the stem. The base of the stem may show cupping.

Figure 13. Picture of advancing, lateral and backing fire vectors.

Look for transition zones between backing and lateral. Heads or stalks may outline lateral transition areas from the advancing fire area.

Advancing Grass Stem Fire Pattern Indicators. Description: Grass stem remains in the advancing area will typically consist of only a small part of the stem base. The stem base may show cupping fire effects. The advancing grass stem area is found by looking for the transition zones between the backing and lateral areas.

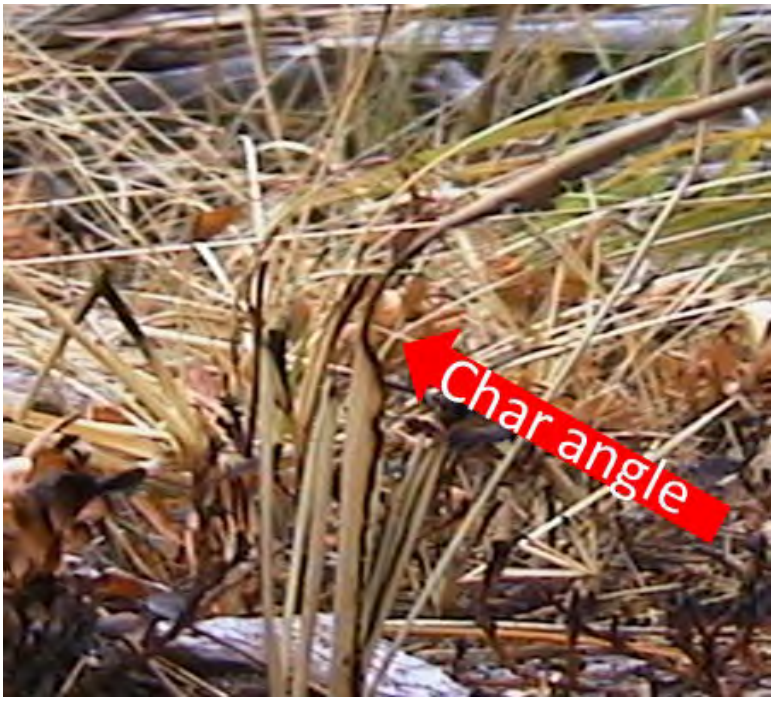
Backing and Lateral Grass Stem Fire Pattern Indicators. Description: Backing fire weakens the side exposed to the oncoming fire. The fire burns the exposed side and causes the stem to fall in the direction the fire came from. This effect is similar to that of putting in an undercut on a tree to direct its fall. Backing and lateral fire pattern indicators are more reliable on lower intensity fires. Grass stems pointing towards the direction the fire came from occurs primarily in backing areas, but may occur in lateral transition zones also.

Backing Fire, Microscale Fire Patterns - Grass Stem

Grass stem microscale fire pattern indicators in the backing fire area will be viewed by the individual heads and stems which generally point towards the oncoming fire, as well as cupping in some of the individual stems of grass.

Grass that grows in clumps may not be entirely consumed, showing protection on the unexposed side. When this occurs in advancing areas, the residual basal stalks will normally show an angle of char that is steeper than the slope and exhibit cupping on the tips, with the low side of the cup on the exposed side.

Figure 20. Picture of grass stalk showing char angle.



11. V and U Fire Pattern Indicators

Description: This is the overall V or U shape associated with typical wildfire progression in the early stages of the fire. Lateral transition zones form exterior perimeter V or U shape with an advancing vector in between. The lateral transition zones typically get further apart as the advancing fire continues unless barriers, fuel changes, or suppression action affects the fire's ability to spread.

The ignition area is generally located in an area of less intense burning near the cup of the U or apex of the V. View and document this pattern from an aerial perspective, if possible.

Figure 61. Example of a V shaped burn pattern.

Wildland fire investigators should recognize that the two patterns, V and U, are formed by different conditions that may provide further clues to the location of the ignition area. U shaped patterns tend to form on flat ground under light wind conditions or on moderate slopes where the ignition area is often located near a shoulder of the cup. A U shaped pattern can be an indication of a combined slope and wind influence on the fire. V fire patterns are primarily influenced by strong winds or steep slopes (or both). The Ignition Area is often located near the apex of the V pattern, including microscale V fire patterns.

When determining the boundaries of the V or U pattern, consider the conditions of the fuels both where the crown no longer exists and where the

crown still exists based on ground fuel consumption. View these indicators from a combination of aerial and ground perspective.

Pattern boundaries may not be confined to fully consumed canopy. Look below the canopy to identify the actual fire boundary. On a smaller scale the pattern may not show up in the canopy, but may be visible below.

V and U indicators can be both macroscale in size and smaller. Because V and U patterns can be formed over shorter and longer periods of time, multiple V or U patterns may be formed due to wind speed and direction changes. Changes in slope may also effect the formation of V and U patterns.

Figure 62. Example or irregular V or U shaped fire pattern.

Tools for Searching a Specific Origin Area or Ignition Area

Whether using a perpendicular lane, parallel lane, or grid search technique, the following practices and tools may need to be applied.

Search each lane or grid as needed:

- Visually.
- Using magnification as necessary.
- Remove lightweight debris by brushing or blowing.
- Use straight edge to focus search pattern.
- Continue locating and marking indicators with flags.
- Employ magnet search for ferrous metals.
- Metal detector search for non-ferrous metals.
- Screen debris and/or bag debris for future analysis when appropriate.
- Continue until the ignition area is identified and/or ignition source is located.
- Document and secure any evidence.
- Continue searching past ignition area or evidence until clear backing indicators are encountered.
- Document the perimeter of the specific origin area.
- Document the location/perimeter of the ignition area.

In all cases, continue to work search pattern up to and through the ignition area.

Visual Search and Magnification: There are a variety of conditions that may exist at each specific origin area depending on the fire intensity, fuels present before and after the fire, and other possible variables. Variations within the fuel bed at the specific origin area may necessitate the use of magnification in some parts of the visual scan and not in others. Magnification can include a standard magnifying glass, high powered reading glasses, or other such devices.

Remove Lightweight Debris: There are many tools that can be used to carefully move lightweight debris during the visual examination. Gently blowing on the debris is often enough to move it and assist examination. Using a bulb syringe is another tool commonly used to carefully move lightweight debris. Hair picks and forceps can also be used along with any other tool which allows for the careful removal of the lightweight debris without causing contamination.

Straight Edge: The use of a straight edge or other such techniques to keep track of the area being visually searched, and in some instances to assist in focusing on an area, helps to conduct a complete visual search. The application of the straight edge or other technique should not disturb any

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NIST National Institute of Standards and Technology • Technology Administration • U.S. Department of Commerce

EXHIBIT 24

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William M. Pitts
Building and Fire Research Laboratory

March 2007

U.S. Department of Commerce
Carlos M. Gutierrez, Secretary

Technology Administration
Robert Cresanti, Under Secretary of Commerce for Technology

National Institute of Standards and Technology
William Jeffrey, Director

Figure 12. Photograph of shredded newsprint in wire-screen cage.

Figure 13. Photograph of May tall fescue in wire-screen cage.

3.1.1. May Tall Fescue Grass

A sample of tall fescue grass (*Festuca arundinacea*) was collected on the NIST campus (GPS location of 39.08.082 N, 77.12.709 W) on May 25, 2006. The site was the outfield of a softball field that was planted in tall fescue about six years ago. The grass had been cut within the past two days. Clippings that had been cut and expelled from the mower and were resting on top of the growing grass were collected. The grass clippings felt dry and light to the touch. The weather over the previous few days had been nearly ideal for drying with no rain, a temperature range of roughly 7 °C to 21 °C, and dew point temperatures on the order of 4 °C.

Spring is a time of rapid grass growth in this region. Significant rain had fallen within the past two weeks. The uncut grass was thick and dark green. As a result of the conditions, the grass had been fairly long when cut, with the clippings having a range of lengths varying from 8 cm to 15 cm. A small amount of the grass was topped with seeds. Even after drying the grass clippings retained a light greenish color. Much of the collected grass consisted of thin blades.

After several weeks of storage in a general purpose laboratory, three independent measurements of free moisture percentage taken over several days yielded values of 12.8 %, 11.9 %, and 13.6 %. These values are typical of those expected when the moisture in the grass has come into equilibrium with air in the surrounding laboratory.

As collected, the tall fescue did not pack well in the sample holders due to its length. Scissors were used to cut bunches of the grass into lengths of 2.5 cm to 5 cm, which were used to form the fuel beds. A mass of 9.0 g of material was found to be adequate for forming a 2.5 cm deep bed when lightly packed into the sample holders. Figure 13 shows a sample of tall fescue grass in the wire-screen cage used for the heated plate experiments. For the remainder of the report these samples will be referred to as “May tall fescue.”

1.4. May Tall Fescue

Both heated plate and cone ignition experiments were done for this fuel.

1.4.1. Heated Surface Ignition Results

Figure 33 summarizes the temperature dependence of the times required for glowing combustion and flaming following the application of May tall fescue fuel beds to the heated plate. The most striking feature of the data is the nearly complete absence of flaming combustion. For the 28 cases in which glowing combustion was observed, only three resulted in flaming. It should be noted that even though a transition to flaming did not occur, the glowing combustion could be quite intense, particularly with an applied wind. When flaming did appear, it was weak and short lived. There is no apparent temperature dependence for whether flaming occurred or not. The flaming behavior for May tall fescue contrasts with that found for shredded newsprint, where

Figure 32. Photograph of the top surface of a shredded newsprint fuel bed following application of a 7.5 kW/m^2 heat flux.

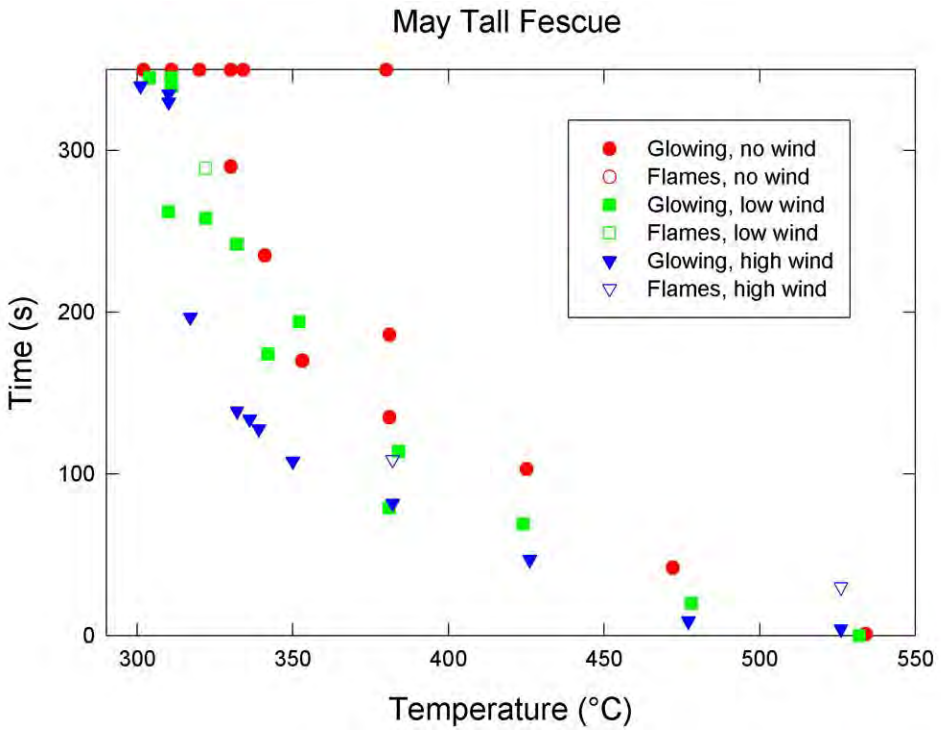


Figure 33. Ignition times for glowing combustion and flaming are shown as a function of temperature for May tall fescue grass fuel beds applied to a heated plate. Results are included for no wind, low wind, and high wind cases.

flaming combustion took place in nearly every experiment in which glowing combustion was observed.

Even though there is scatter in the glowing combustion data, it is clear that the times required for ignition fall on three distinct bands corresponding to no wind, low wind, and high wind conditions. The times required for ignition increased from near zero around 525 °C to periods approaching 300 s for temperatures around 325 °C. Similar to observations for the shredded newsprint, the ignition times for a given temperature decreased with increasing wind. Unlike for the shredded newsprint, the largest reductions occurred on going from low wind cases to high wind cases.

The proportional change in going from no wind to low wind seems smaller than for the shredded newsprint. At the lower temperatures the reduction in ignition times on going from no wind to high wind appears to be greater than a factor of two for the grass.

There are other differences between the May tall fescue and shredded newsprint results. Even though the shredded newsprint transitions to flaming much more readily than the grass, the May tall fescue seems to smolder more easily. This can be seen by comparing times required for glowing combustion at a given temperature, which are generally lower for the grass, and noting that glowing combustion develops for lower plate temperatures (as low as 310 °C) than for the shredded newsprint (as low as 340 °C).

Another difference between the shredded newsprint and May tall fescue concerns the lowest

temperatures for which smoldering or flaming was observed for the three wind conditions. For newsprint, combustion appeared at lower plate temperatures as the wind was decreased, with the lowest temperatures capable of igniting the newsprint being observed for the no-wind condition. The opposite is true for the data shown in Figure 33, with the lowest ignition temperatures observed with wind present. This observation suggests that for the low temperature end of the surface ignition curve the development of glowing combustion for May tall fescue is more sensitive to the amount of air supplied to the fuel surface than is shredded newsprint, since the additional air effectively counteracts the additional cooling resulting from the air flow.

The appearance of the fuel beds following an experiment provides additional insights into the importance of air flow on the reaction behavior of the May tall fescue fuel beds.

Figure 34 shows bottom and top views of a fuel bed that had developed glowing combustion after being placed on the heated plate held at 341 °C without an applied wind. It is clear that the smoldering spread through the entire bed. There is a narrow region of unburned fuel around the three edges of the fuel bed with wire-screen extending below the plate. No unburned fuel is evident on the side of the cage with the narrow open slit at the base of the wire-screen side wall. In fact, the remaining fuel at this location seemed to be grayer, suggesting more complete combustion.

These observations agree with the earlier discussion that the air inflows on the cage side wall with the open slit differs from that through the sides with full wire-screen sidewalls.

Figure 35 shows photographs of the bottom and top of a fuel bed following removal from the heated plate held at 336 °C with a high wind applied. Glowing combustion was observed at

Figure 34. Bottom (left) and top (right) views of a May tall fescue fuel bed are shown after the fuel was removed from the heated plate held at 341 °C with no wind applied. Glowing combustion was observed after 235 s.

Figure 35. Bottom (left) and top (right) views of a May tall fescue fuel bed are shown after the fuel was removed from the heated plate held at 336 °C with a high wind applied.
Glowing combustion was observed after 134 s.

134 s following application to the plate and was allowed to proceed for a period of time. The effects of the air flow are marked. The fuel bed has three distinct bands that run perpendicular to

Figure 36. Bottom (left) and top (right) views of a May tall fescue fuel bed are shown after the fuel was removed from the heated plate held at 311 °C with no wind applied. Glowing combustion was not observed.

the wind direction and extend from the top to the bottom of the bed. There is an area of unburned grass on the upstream side of the bed. Apparently, cooling associated with the air flow was sufficient to prevent propagation of the glowing combustion into this area. Near the center there is a grayish area indicating more complete combustion. This is likely the result of more intense reaction due to a greater availability of air. On the downstream side of the fuel bed the tall fescue is simply blackened, suggesting incomplete reaction of the fuel. This type of burning pattern is typical of those observed with an applied wind, but with the low wind the unburned upstream portion was narrower, and the gray band was located closer to the upstream edge.

It was noted above that glowing combustion for the May tall fescue was not observed below 340
°C in the absence of a wind. However, the appearance of the fuel beds following exposure to the heated plate at lower temperatures indicates that non glowing smoldering was still taking place at much lower plate temperatures. Figure 36 shows the bottom and top of a fuel bed that was held at 311 °C without an applied wind. The bottom of the fuel bed is heavily blackened across its entire extent. On the top there is circle of similar blackened material surrounded by a band of unburned grass. Such blackening is not expected in the absence of fuel surface oxidation. These observations indicate that a non glowing smolder wave started near the heated plate and passed upward to the top surface of the fuel bed. The most likely reason for the area of unburned grass around the outside of the top surface is that this grass was cooled by air being entrained in the thermal plume rising from the heated surface and smoldering fuel.

For the lowest plate temperature tested without an applied wind, 302 °C, the fuel bed had a similar appearance to that seen in Figure 36.

Figure 37. Bottom (left) and top (right) views of a May tall fescue fuel bed are shown after the fuel was removed from the heated plate held at 311 °C with a low wind applied.
Glowing combustion was not observed.

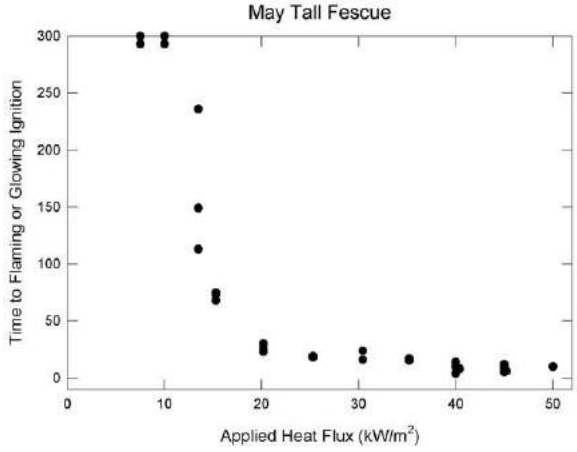
Figure 37 shows similar photographs for a fuel bed held at the same surface temperature, 311 °C, as in Figure 36, but with a low wind applied. Most of the bottom is blackened with the exception of a narrow band along the upwind (right hand side in photograph) edge. On the top surface of the fuel bed there is a brown band that extends across the bed perpendicular to the wind direction and just downstream of the center. Deeper within the bed the band is much darker. Clearly there had been some pyrolysis of the fuel in contact with the plate and in the vicinity of the line plume formed by heated gases rising within the fuel bed. Smoldering does

not seem to have occurred, since there is no indication that areas of pyrolysis moved away from the heated areas.

Tests with low and high winds with plate temperatures near 300 °C showed partial blackening of the bottoms of the fuel bed, but there were larger areas of unblackened fuels along the upstream edges. For the high wind case, this area extended nearly half way across the bed. For both low and high wind cases there were light brown bands across the tops of the fuel bed, with the band for the high wind case located further downstream.

1.4.2. Radiative Heating Ignition Results

The heated plate experiments for May tall fescue showed that these fuel beds were unlikely to transition to flaming, even when glowing combustion was present. With one exception, flaming was only observed in the radiative ignition experiments for AHFs equal to or greater than 40 kW/m^2. On the other hand, glowing combustion was observed with much lower AHFs. Figure 38 shows the times required for glowing or flaming combustion to appear following application of the radiative heat flux as a function of the AHF. Similar to the results for shredded newsprint (see Figure 27), the ignition times increased very slowly as the AHF was reduced from



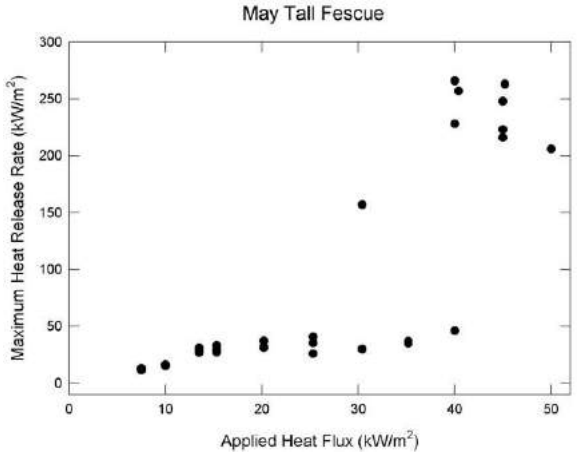


Figure 38. Values of time to flaming or glowing ignition and maximum observed heat release rate are plotted as functions of applied heat flux for May tall fescue fuel beds.

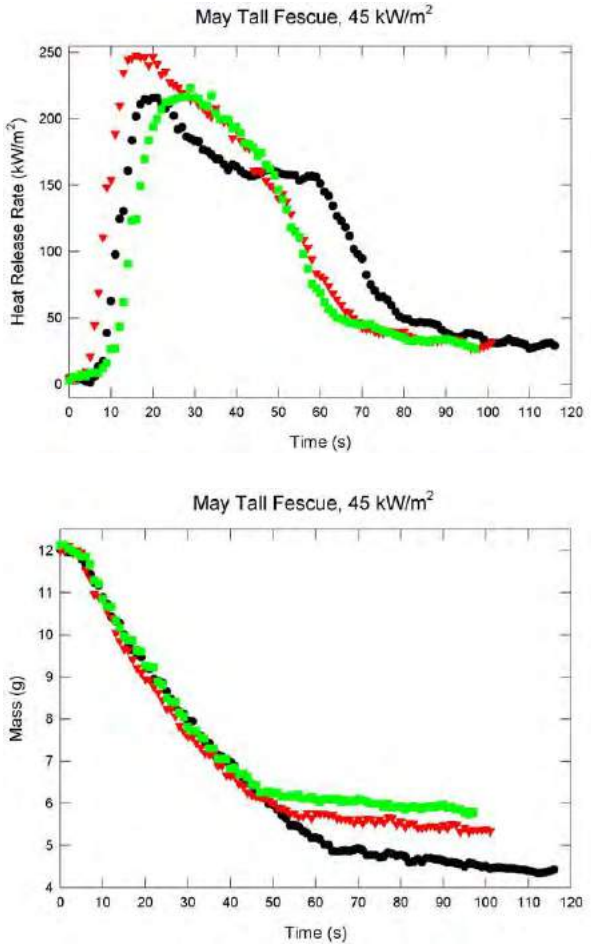


Figure 39. Heat release rates and sample masses are plotted as a function of time for three experiments in which a 45 kW/m^2 heat flux was applied to May tall fescue.

50 kW/m^2 to 20 kW/m^2. For still lower AHFs the ignition times began to increase rapidly with decreasing AHF before ignition was no longer observed with AHFs near 10 kW/m^2 and lower.

Even though the ignition time plots for shredded newsprint and May tall fescue have similar appearances, distinct differences in burning behavior appear in the plots of maximum HRR versus AHF. Maximum HRRs for the shredded newsprint remained high for AHF as low as 11 kW/m^2, while maximum HRRs for the May tall fescue dropped to low values for AHFs lower than 40 kW/m^2. The abrupt drop in HRR for the May tall fescue around an AHF of 40 kW/m^2 is due to the absence of flaming combustion at lower AHFs.

Plots of HRR and fuel mass versus time provide additional insights into the ignition behaviors of the May tall fescue fuel beds. Figure 39 shows three sets of results for an AHF of 45 kW/m^2.

After a brief period during which there was a relatively slow loss of fuel mass and low HRR, both the HRRs and mass loss rates increased rapidly, reflecting the onset of flaming. Flaming

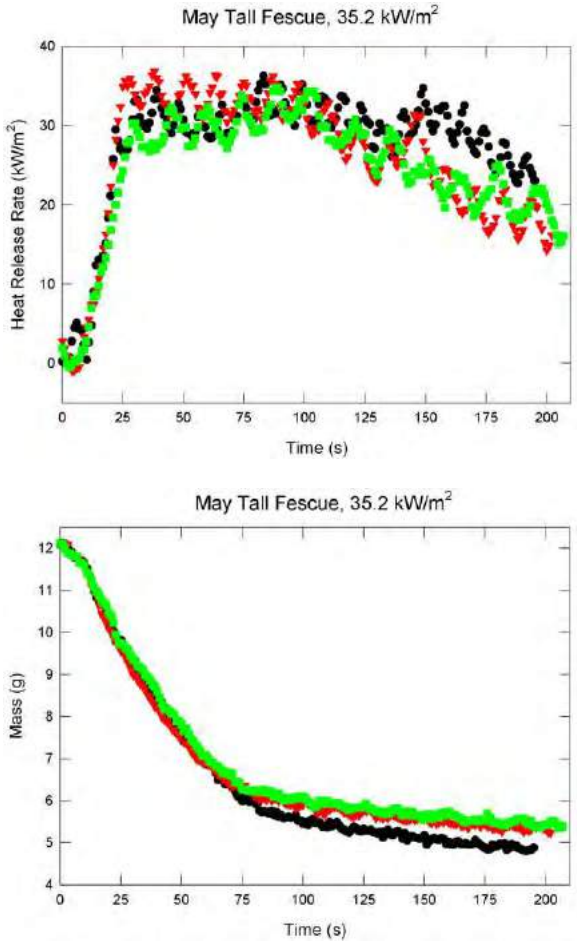


Figure 40. Heat release rates and sample masses are plotted as a function of time for three experiments in which a 35.2 kW/m^2 heat flux was applied to May tall fescue.

lasted for about 50 s to 60 s before dying down. Apparently, smoldering combustion continued after the flaming period since measurable HRRs and low mass lost rates were still present.

Flaming was not observed when an AHF of 35.2 kW/m^2 was applied to the May tall fescue. Figure 40 shows HRRs and masses for three experiments. Similar to Figure 39, there is a brief induction period lasting about 10 s during which there is little HRR, but mass loss is taking place. After this time, the HRRs began to increase rapidly, rising to values on the order of 32 kW/m^2. HRR values remained nearly constant for about 50 s before beginning to fall slowly. The fuel mass loss rate abruptly accelerated at the same time the HRR first begins to rise. This is near the time when glowing combustion first appeared, suggesting that glowing combustion spreading over the fuel bed is responsible for the increased HRR and mass loss rate. At roughly the same time that the HRR began to drop slowly there was a distinct change in the slope of the mass loss, with the mass loss rate decreasing abruptly.

When the effective heat of combustion (EHC) is defined as the HRR divided by the mass loss rate, it is clear that the EHC abruptly increased at the time when the mass loss rate drops. These observations suggest that at least two types of fuel surface oxidation reactions were taking place. The first has a relatively low EHC and likely corresponds to oxidative surface reaction of easily pyrolysed fuel components. Initial pyrolyis of cellulosic fuels is known to form an enriched- carbon char that has a higher EHC that reacts more slowly. The oxidation of the char formed during the initial more rapid oxidative pyrolysis of the grass is most likely responsible for the period of relatively high HRR with relatively low mass loss rate.

In Figure 39 it is evident that the HRR and mass loss behavior following the flaming periods are similar to those observed at the longest times in Figure 40. This suggests that the flaming observed for the May tall fescue with the highest AHFs also formed a high energy containing char that then oxidized more slowly.

Comparison of the HRR and mass loss behaviors observed for AHFs over the range of 20 kW/m^2 to 35 kW/m^2 showed that they were similar to those in Figure 40 with some variation in slopes

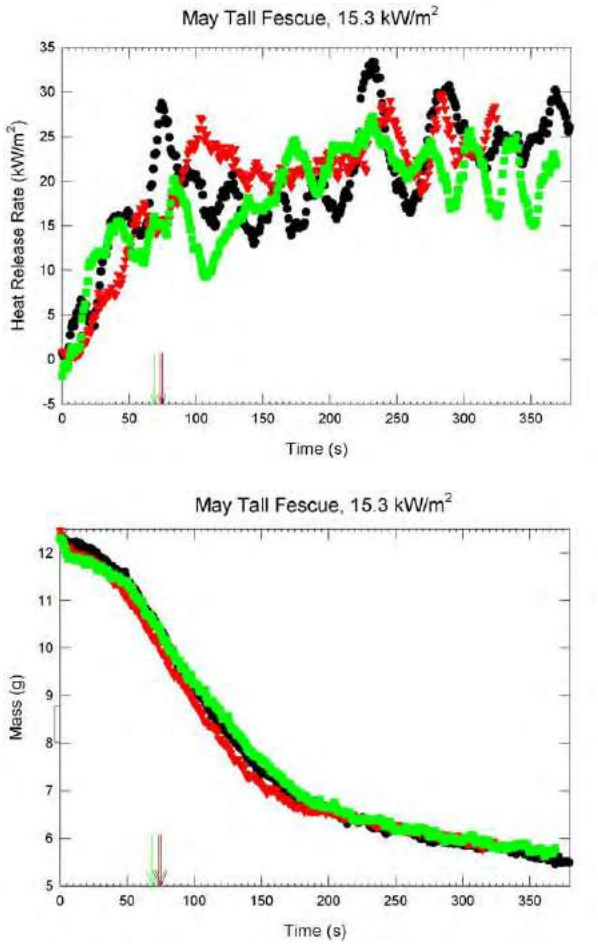


Figure 41. Heat release rates and sample masses are plotted as a function of time for three

experiments in which a 15.3 kW/m^2 heat flux was applied to May tall fescue. The arrows indicate the times when glowing combustion appeared.

and transition times. The relatively short times required for glowing combustion to develop for these AHFs (see Figure 38) suggest that glowing combustion rapidly developed and spread over the fuel bed, leading to the formation of chars that then oxidized more slowly.

For AHFs less than 20 kW/m^2 the time required for glowing combustion to develop rapidly increased. Figure 41 shows three sets of measured HRRs and masses as a function of time for an AHF of 15.3 kW/m^2. Color-coded arrows have been added to the plots indicating the times when glowing combustion was observed. The data show that low HRRs developed shortly after the fuel was exposed to the AHF. Relatively slow mass loss rates appeared around the same time. Around 50 s after exposure there was a clear shift in the mass behavior, with the mass loss rate increasing. This change is most likely associated with the development of sustained smoldering. Interestingly, glowing combustion did not appear until about 20 s after smoldering developed. This suggests that the initial smoldering is non glowing and that transition to glowing required a short period of time. These conclusions are consistent with findings from the heated plate experiments that showed that non glowing smoldering occurred at lower temperatures.

The observation of nearly constant HRRs while there is a distinct reduction in the mass loss rate around 175 s indicates that two distinct EHCs occurred for this lower AHF. This behavior is similar to that observed with AHFs covering the 20 kW/m^2 to 35 kW/m^2 AHF range.

For each there was a short induction period at the start of the heating during which the HRR remained close to zero but during which there was a slow mass loss. After the induction period the HRR began to rise, but the increases were much slower than when 15.3 kW/m^2 was used. At roughly 75 s there was a distinct increase in the mass loss rate suggesting that smoldering had developed. Glowing combustion was not observed until much later when a significant fraction of the more rapid mass change had already occurred. The sustained HRR and reduced mass loss rate at longer times again indicates that an initial pyrolysis produced a char that then oxidized with a higher effective

heat of combustion. The much longer periods required for each of these stages as compared to cases with AHFs of 15.3 kW/m^2 requires a strong dependence on AHF.

Glowing combustion was not observed for experiments with AHFs of 10 kW/m^2 and 7.5 kW/m^2. Figure 43 shows plots of HRR and mass as functions of time for two experiments with an AHF of 7.5 kW/m^2. After the heat fluxes were applied there were long periods lasting several hundred seconds during which a very slow mass loss occured without significant HRR. The mass lost could be due to non oxidative pyrolysis or moisture removal. During one of the experiments the mass loss rate accelerated around 400 s. There seems to have been a very small increase in the measured HRR at the same time, suggesting limited oxidation was taking place. Interestingly, both the HRR and mass loss rate seemed to decrease back to the lower levels after about 100 s, a time when a large fraction of the original mass remained. This suggests that even though some non glowing oxidation took

place, there was no sustained smoldering. There is a hint that the HRR for the second run may have started to increase after 600 s, just as the experiment ended.

Results with AHFs of 10 kW/m^2 were similar to those for 7.5 kW/m^2 with a nearly linear mass change over the first 200 s followed by an increased mass loss rate lasting about 100 s. There seemed to be a very small HRR that only developed at roughly the same time as the change in mass lost rate. After 600 s about 20 % of the original mass remained.

Some blackening of the grass was observed at the lower AHFs. Figure 44 shows an example of a fuel bed at the conclusion of an experiment in which glowing combustion did not occur. Some blackening of the surface is evident. The blackening is not uniform, but has a distribution over the top of the fuel bed that is similar to that seen for the shredded newsprint in Figure 32. As before, this distribution could be due to the air flow distribution or small variations the cone thermal radiation distribution.

Scotch®

HEAVY-DUTY GRADE
CATÉGORIE DE GRAND RENDEMENT
CALIDAD DE USO RUDO

Vinyl Electrical Tape
Ruban isolant en vinyle
Cinta eléctrica de vinilo

Super 88

- Thicker for heavy-duty use
- Super strong adhesion
- De construction plus épaisse pour utilisations de grand rendement
- Offre une adhérence super puissante
- Grueso para un uso rudo
- Adhesión superresistente

MADE IN USA

221°F (105°C)
OPERATING TEMPERATURE
0°F (-18°C)

FLAME RETARDANT • LEAD FREE
IGNIFUGE • EXEMPT DE PLOMB
RETARDANTE DE LLAMA • LIBRE DE PLOMO

10 ROLLS

3/4 IN x 66 FT (22 YD) x .0085 IN
19 mm x 20,1 m x 0,215 mm
TOTAL: 660 FT (201 m)

3M

UL LISTED 539H Insulating Tape

Flame Retardant and Cold Resistant. Suitable for use at not more than 600 V and not more than 80°C (176°F).
Ignifuge et Résista au froid. Concu pour être utilisé à 600V maximum et à 80°C (176°F) maximum.
De combustión lenta y Resistente al frío. Adecuada para usarse con voltajes no mayores de 600V y con temperaturas no mayores de 80°C (176°F).

CSA DVE e RoHS 2015/863/EU

-18° to 105°C IEC 60454-3-1-7/F-PVCP/90

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EXHIBIT 25


N
EYEWITNESS TESTIMONY
POLE
NO FIRE
FIRE
EXHIBIT 26
Google Earth

LONE STAR
FOREST SERVICE

LAW ENFORCEMENT DEPARTMENT
VOLUNTARY STATEMENT (NOT UNDER ARREST)

I, Chris Evans, I, Chris Evans, am not under arrest for, nor am I being detained for any criminal offenses concerning the events I am about to make known to Brantley Jones, who has identified himself to me as an investigator for the Lone Star Forest Service. Without being accused of or questioned about any criminal offenses regarding the facts I am about to state, I volunteer the following information of my own free willy, for whatever purposes it may serve. I am 51 years of age and I live at 902 N. Cedar Ave. in Armadillo, Lone Star.

On March 16, 2017, at roughly 2:30 PM, I was headed north on County Road 23 and heading toward State Highway 175. An employee of Big City Electric Co-Op called and said he thought he saw smoke in the area of the Watson Ranch. I was close to that area, so I turned around and right away I could see some smoke. I knew it was real windy and that a fire could get out of control fast, so I drove down toward the ranch headquarters to see if I could locate what was causing the smoke. As I got 1/2 mile from the ranch headquarters, I saw flame in front of the Watson Ranch house. The fire was snaking through the front yard and burning in the bar ditch headed north up the side of the road. I also saw the field north of the house was also on fire. I called the Armadillo 911 Emergency number to report the fire. It had not jumped to the pasture east of the road at that time. By roughly 3:20, it had jumped that road and started burning northeast at a fast rate.

I have read each page of this statement, consisting of one page, and I certify that the facts contained herein are true and correct.

/s/ Chris Evans

Dated March 19, 2017 at 1:04 PM.

EXHIBIT 27

TRANSCRIPTION OF CHRIS EVANS 911 CALL

1.	DISPATCHER:	Good afternoon. 911 Call Center. What's your emergency?
2.	MR. EVANS:	Yes ma'am this is Chris Evans with Big City Electric. I'm out by the Watson Ranch.
3.	DISPATCHER:	Is this about the fireworks?
4.	MR. EVANS:	No, I've got a grass fire in front of the Watson Ranch headquarters.
5.	DISPATCHER:	Okay just a second.
6.	MR. EVANS:	Okay.
7.	DISPATCHER:	Don't hang up on me I need to get this information. Okay -
8.	MR. EVANS:	No ma'am I can - I can give you section numbers and everything.
9.	DISPATCHER:	175 and then what?
10.	MR. EVANS:	175 then south on County Road 40. The fire is directly in front of the Watson's house. And it is moving ... northeast is the way the fire's moving.
11.	DISPATCHER:	Okay. Where's the fire again?
12.	MR. EVANS:	So it has...it is right in front of the house. I'm afraid it could catch it on fire.
13.	DISPATCHER:	Okay give your name again?
14.	MR. EVANS:	Chris Evans with Big City Electric
15.	DISPATCHER:	Okay give me a phone number.
16.	MR. EVANS:	847 - 262 - 6698.
17.	DISPATCHER:	Okay you're saying on 175 and County Road 40 in front of the Watson house, right?
18.	MR. EVANS:	Yes ma' am it's going to be about 2 miles south on County Road 40 after you turn off of Highway 175.
19.	DISPATCHER:	Okay. I'll get the fire guys started that way. OK? Hello?

EXHIBIT 28

2

2017 National Electrical Safety Code® (NESC®)

C2-2017




EXHIBIT 29

NESC® 100TH ANNIVERSARY EDITION

IEEE

3 Park Avenue, New York, NY 10016-5997, USA

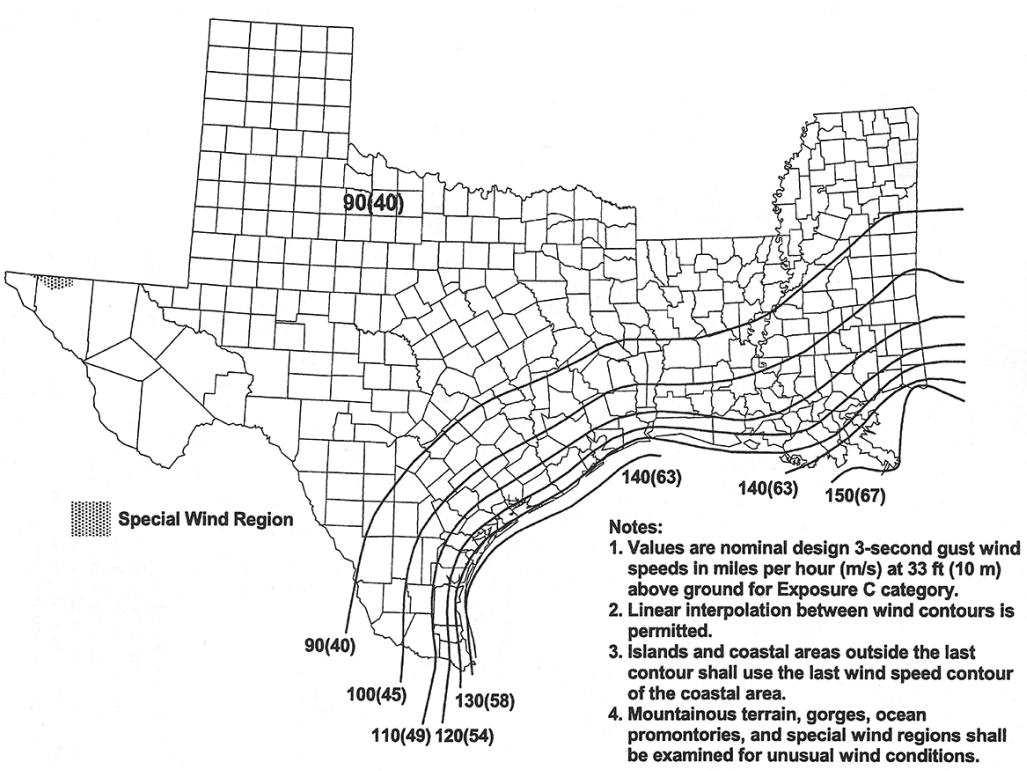

Figure 250-2(c)—Western Gulf of Mexico hurricane coastline

NOTE: Figure 250-2(c) reprinted with permission from ASCE, 1801 Alexander Bell Dr., Reston, VA 20191 from ASCE 74-10, Guidelines for Electrical Transmission Line Structural Loading. Copyright © 2010.


GROUND WIRE
TRANSFORMER JUMPER
EXHIBIT 30


EXHIBIT 31

Call Sheet Report
Armadillo 911 Center

Call #: 17-0924
Date/Time: 3/16/2017 14:25:14
Type: FIREWORK CALL
Priority: LOW
How Rcvd: PHONE
Caller ID: Winters, Gary 214-824-3311
Sent to Dispatch: n/a

Dispatcher: Stavropoulos, Atina
Disposition: Assigned, Completed

Call to Location:

One Half Mile East of Watson Ranch HQ

EXHIBIT 32

NO. 19-000711-CV

KELLY TAYLOR,	§	**IN THE 412th DISTRICT COURT**
	§	
Plaintiff,	§	**IN AND FOR**
v.	§	
	§	
BIG CITY ELECTRIC COOPERATIVE, INC.	§	**TARRANT COUNTY**
	§	
	§	
Defendant.	§	**STATE OF LONE STAR**

FINAL JURY INSTRUCTIONS

Members of the jury, I shall now instruct you on the law that you must follow in reaching your verdict. It is your duty as jurors to decide the issues, and only those issues, that I submit for determination by your verdict. In reaching your verdict, you should consider and weigh the evidence, decide the disputed issues of fact, and apply the law on which I shall instruct you to the facts as you find them, from the evidence.

The evidence in this case consists of the sworn testimony of the witnesses, all exhibits received into evidence, and all facts that may be admitted or agreed to by the parties. In determining the facts, you may draw reasonable inferences from the evidence. You may make deductions and reach conclusions which reason and common sense lead you to draw from the facts shown by the evidence in this case, but you should not speculate on any matters outside the evidence.

In determining the believability of any witness and the weight to be given the testimony of any witness, you may properly consider the demeanor of the witness while testifying; the frankness or lack of frankness of the witness; the intelligence of the witness; any interest the witness may have in the outcome of the case; the means and

opportunity the witness had to know the facts about which the witness testified; the ability of the witness to remember the matters about which the witness testified; and the reasonableness of the testimony of the witness, considered in the light of all the evidence in the case and in light of your own experience and common sense.

The issues for your determination are (1) whether the death of Timothy Taylor was caused by the negligence of Big City Electric Cooperative, Inc., (2) whether the death of Timothy Taylor was caused by his own negligence, and (3) if both Big City Electric Company, Inc.s negligence and Timothy Taylor's own negligence contributed to his death, whether Big City Electric Cooperative, Inc's degree of fault is greater than Timothy Taylor's. In that regard, you are instructed that Kelly Taylor has the burden of proof on the negligence claim against Big City Electric Cooperative, Inc., meaning that Kelly Taylor must convince you by a preponderance of the evidence that Timothy Taylor's death was the result of Big City Electric Cooperative, Inc.'s negligence, if any. You are further instructed that Big City Electric Cooperative, Inc. has the burden of proof on the claim that Timothy Taylor's death was caused in whole or in part by his own negligence, if any.

You are instructed that the term "negligence" means failure to use ordinary care, that is, failing to do that which a person of ordinary prudence would have done under the same or similar circumstances or doing that which a person of ordinary prudence would not have done under the same or similar circumstances.

"Ordinary care" means that degree of care that would be used by a person of ordinary prudence under the same or similar circumstances.

"Proximate cause" means that cause which, in a natural and continuous sequence, produces an event, and without which cause such event would not have occurred. In order to be a proximate cause, the act or omission complained of must be such that a person using ordinary care would have foreseen that the event, or some similar event, might reasonably result therefrom. There may be more than one proximate cause of an event.

Answer "Yes" or "No" to all questions unless otherwise instructed. A "Yes" answer must be based on a preponderance of the evidence unless you are otherwise instructed. If you do not find that a preponderance of the evidence supports a "Yes" answer, then answer "No." The term "preponderance of the evidence" means the greater weight and degree of credible evidence admitted in this case. Whenever a question requires an answer other than "Yes" or "No," your answer must be based on a preponderance of the evidence unless you are otherwise instructed.

At this point in the trial, you, as jurors, are deciding if the death of Timothy Taylor was caused by the negligence of Big City Electric Cooperative, Inc. or by his own negligence, or both. If you find Big City Electric Cooperative, Inc. was at fault in whole or in part, you will hear additional argument from the attorneys and you will hear additional witnesses testify concerning damages. Until that time, you are not to concern yourselves with any question of damages.

Your verdict must be based on the evidence that has been received and the law on which I have instructed you. In reaching your verdict, you are not to be swayed from the performance of your duty by prejudice, sympathy, or any other sentiment for or against any party. When you retire to the jury room, you should select one of your members to act as

foreperson, to preside over your deliberations, and to sign your verdict. You will be given a verdict form, which I shall now read and explain to you.

(READ VERDICT FORM)

When you have agreed on your verdict, the foreperson, acting for the jury, should date and sign the verdict form and return it to the courtroom. You may now retire to consider your verdict.

NO. 19-000711-CV

KELLY TAYLOR,	§	**IN THE 412th DISTRICT COURT**
	§	
Plaintiff,	§	**IN AND FOR**
v.	§	
	§	
BIG CITY ELECTRIC COOPERATIVE, INC.	§	**TARRANT COUNTY**
	§	
	§	
Defendant.	§	**STATE OF LONE STAR**

JURY QUESTION NO. 1

Did the negligence, if any, of the parties below proximately cause the death of Timothy Taylor?

Answer "Yes" or "No" for each of the following:

1. Big City Electric Cooperative, Inc. _____

2. Timothy Taylor _____

If you have answered "yes" with respect to more than one party in response to Jury Question No. 1, answer the following Jury Question; otherwise, do not answer the following Jury Question.

JURY QUESTION NO. 2

What percentage of the negligence that caused the death of Timothy Taylor do you find to be attributable to each of those listed below and found by you, in your answer to Jury Question No. 1, to have been negligent?

1. Big City Electric Cooperative, Inc. _____

2. Timothy Taylor _____

Total 100%

CERTIFICATE

We the jury, have answered the above and foregoing questions as herein indicated, and herewith return same into Court as our verdict.

_____
Presiding Juror

To be signed by those rendering the verdict if not unanimous.
