

Electrical Utility Fires

9.1 Introduction

In 2019, the Legislature enacted R.C.W. 76.04.780 which required the Department of Natural Resources to convene a Utility Wildfire Prevention Task Force. The purpose of the task force is to address and manage issues associated with reducing and mitigating the risks of wildland fires involving utility companies. In 2021, the Legislature amended the statute to create a permanent Utility Wildland Fire Prevention Advisory Committee to continue the work of the Task Force and provide a forum for identification and development of wildfire-prevention and risk-mitigation solutions for electric utility infrastructure and wildland fire suppression and response.

The manufacture, transmission, and distribution of electricity presents inherent risks and hazards which include the potential for wildfire ignition. Because electricity is an essential component of modern life, electrical infrastructure is ubiquitous. Electrical infrastructure, including power lines, exists in a variety of climatic and environmental conditions associated with elevated wildfire risk. Industry standards and regulations are continually revisited and revised to help ensure that electricity is safely manufactured and delivered to the consumer. Nonetheless, even with safety measures, electrical infrastructure remains a potential source of wildfire ignition across the state.

The purpose of this chapter is to provide direction and guidance to our wildland fire investigators when working on wildland fires that involve electrical utilities. As with the cause of any wildfire, the cause of a wildfire in the vicinity of an overhead electrical power line or other electrical infrastructure cannot be presumed. The cause of a wildfire may only be determined through a thorough and complete investigation.

9.2 Definitions

Below is a general listing of terms used to describe components of an electrical transmission and distribution system that are commonly encountered in wildfire investigation.

Conductors – The wire or cable used to transport electrical current from one point to another. Typical conductors are made of either copper or aluminum.

Connectors and clamps – These pieces of equipment are used to connect conductors. Examples of clamps and connectors are hot tap clamps, split bolt connectors, LM connectors, and Fargo compression connectors.

Distribution Lines – That part of the electrical supply system that distributes electricity at medium voltage from a transformer substation to transformers or other step-down devices, service customer premises, which finally supply power at the voltage required for customer use.

Insulator – Overhead power lines are supported on insulators mounted on the support poles or towers. The purpose of the insulator is to protect the conductor from making grounding contact

with the power pole. Insulators are most commonly made of porcelain, but they sometimes are made of glass, steatite, or other non-conductive materials.

Service Lines – The service line transports electricity from a transformer to the weather head at the customer's location. Generally, they are enclosed in a layer of insulation, which protects the line from arcing. Service lines are closer to the ground and often come into contact with standing vegetation such as tree limbs.

Substation – An electrical facility containing switches, circuit breakers, buses, and transformers for switching power circuits and transforming power from one voltage to another, or from one system to another.

Transformer – A device that changes electric power from one voltage level to another. Use of transformers allows electricity to be sent and distributed over long distances of conductor to the end-user. Transformers may be used to either increase or decrease the voltage.

Transmission Lines – Transmit high-voltage electricity from the generation source or substation to another substation in the electric distribution system.

Other resources for information related to this section can be found at:

- <https://www.osha.gov/etools/electric-power/glossary-terms#term-c>
- <https://www.price-electric.com/content/glossary-electrical-and-utility-related-terms>
- <https://www.bpa.gov/news/pubs/Pages/Definitions---C.aspx>

9.3 Ignition Considerations

Some of the common types of events that may be a factor in a utility related wildland fire are listed below. The list is intended to provide examples and should not be considered a comprehensive or exclusive list of considerations when investigating utility related wildfires.

Airborne Objects – Airborne objects such as a wind-blown tarp, roofing material, or Mylar balloons coming into contact with the energized conductors.

Animals – Larger wing span birds and some mammals are capable of bridging the gap between phases or between phase and ground creating a short circuit.

Conductor Failure or Faulting – A fault or fault current is an abnormal or unintended current. Conductor Failure occurs when a conductor breaks and falls to the ground. If the conductor is energized at the time, it may cause a line to ground fault. A line to ground fault may cause arcing and ignite a fire. Faulting may also occur between two or more conductors when line sag allows the conductors to come into contact or arc to an adjacent phase line or vegetation. High winds, animals, airborne objects, and fallen trees or limbs among other things may cause conductor failure or faulting.

Connector or Clamp Failure – Connectors or clamps may loosen or otherwise fail, resulting in arcing or conductor failure. The failure of a clamp or connector may also cause arcing as a result of the conductor falling to the ground or coming in contact with objects.

Insulators - Dirty or failed insulators may cause current leakage. Current leakage occurs when some current in the conductor flows to ground or other electrical components. Current leakage may occur and result in 'pole top' fires.

Fuse Activation – When a standard cut-out fuse opens to interrupt a fault current, the fuse expels gas and potentially molten metal which may ignite a fire.

Human Activity – Human activity such as firearm use and vehicle or aviation operations in the area of conductors may cause line failure or a fault that results in a fire.

Line Slap – When excessive line sag occurs, the conductors may come into contact or arc between one another. Line slap is most often seen during a high wind event.

Transformer Failure – Once a failure occurs, overheated oil or molten metal droplets may fall from the transformer to the ground and come into contact with receptive fuels, igniting a fire.

Vegetation – Trees or limbs growing too closely to the conductors may come into contact with the conductors when energized. Contact could be the result of green or dead trees or limbs that fall onto or into the conductors, regardless of whether the tree or limb originates inside and outside the utility right-of-way. Contact between vegetation and conductors may be caused by natural factors such as tree growth and mortality or human factors such as logging operations or vehicle collisions that cause trees to come into contact with energized lines.

9.4 Investigative Procedures

As with any wildland fire investigation, it is extremely important that the investigator upon arrival at the fire scene take a few moments and identify any and all potential health and safety hazards.

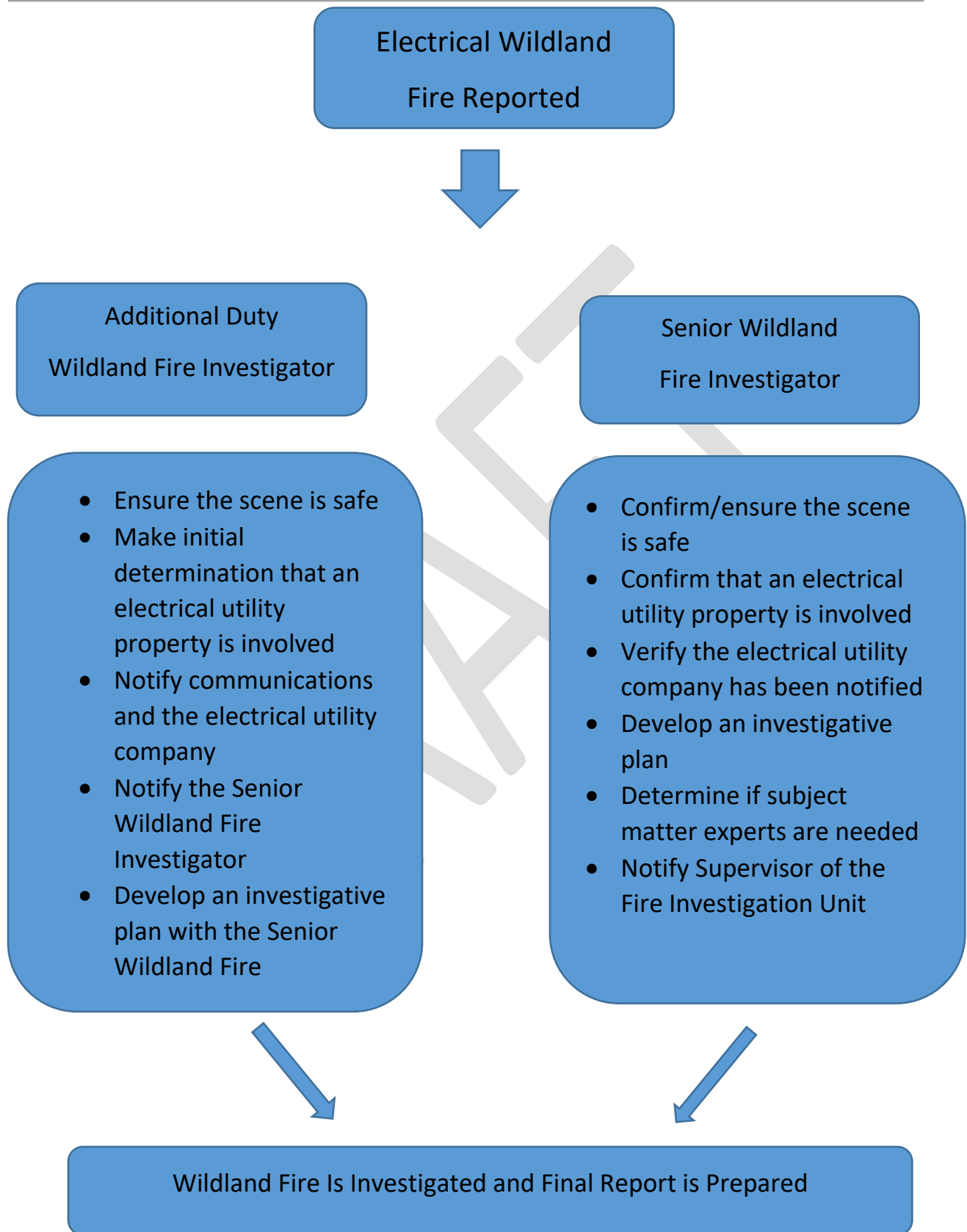
Once the wildland fire investigator has reason to believe that electrical power lines or other electrical equipment may have been a cause or damaged by the progression of the wildland fire, the investigator shall take the following steps and document their investigative steps in the Wildland Fire Investigation Report:

1. Notify the region communications center, detailing the location, the closest power pole number to the electrical equipment involved in the fire, and if it can be safely determined, the type of damage to the electrical equipment (e.g. down power lines, power pole damage, blown fuse, transformer damage, etc.)
2. Notify the affected/involved electrical utility company through the region communication center and request that the region communication center record the notification on its computer aided dispatch (CAD) log, to include the date, time, and the identity of the person notified.
3. Notify the Department of Natural Resource (DNR) Senior Wildland Fire Investigator (SWFI) for your region of the circumstances and nature of involvement concerning the electrical utility.

4. The wildland fire investigator shall discuss and develop an investigative plan with the Senior Wildland Fire Investigator to ensure that a proper and thorough investigation will be completed. For fires requiring a Type 1, 2, or 3 incident response level (high value loss/cost), the plan could include additional resources needed to complete the investigation; such as, a vegetation management specialist, electrical engineer or additional wildland fire investigators.

Senior Wildland Fire Investigator Responsibilities:

1. The Senior Wildland Fire Investigator for the region shall assess the nature and complexity of the wildland fire description as provided by the region communications center, and the wildland fire investigator, and provide any additional investigative assistance as needed. The Senior Wildland Fire Investigator shall consider any additional relevant information such as adverse weather conditions or warnings and potential human interactions in their overall assessment of the wildland fire.
2. Senior Wildland Fire Investigators shall respond to ALL wildland fires that require a Type 1, 2, or 3 incident response level. The Senior Wildland Fire Investigator will work cooperatively with the on-scene wildland fire investigator to develop a response plan to meet the level of complexity of the wildland fire investigation. If the assistance of a subject matter expert is needed, that request will go through the Supervisor of the Fire Investigation Unit for approval and contracting, if no agency personnel with the desired qualifications can fill the request.
3. Senior Wildland Fire Investigators shall notify the Supervisor of the Fire Investigation Unit of ALL electrical power utility involved wildland fires.



9.5 Evidence Procedures

The purpose of this section is to aid and assist the wildland fire investigator with gathering evidence that pertains to wildland fire investigations involving electrical utilities.

Revised Code of Washington (R.C.W.) 76.04.015 outlines the fire protection powers and duties for the Washington State Department of Natural Resources (DNR). DNR wildland fire investigators shall annually review this section to ensure compliance with R.C.W. 76.04.015(c).

1. DNR wildland fire investigators shall work cooperatively, to the extent possible, with electrical utilities, property owners, and other interested parties to identify and preserve evidence related to a wildland fire involving an electrical utility.
2. Except as described below, DNR wildland fire investigators while conducting their wildland fire investigation are authorized, without court order, to take possession or control of relevant evidence that is found in plain view and belonging to any person, firm, or corporation.
3. To the extent possible, the wildland fire investigator shall notify the person, firm, or corporation of their intent to take possession or control of the evidence. If notification is done verbally, the wildland fire investigator shall note the date, time, and the name of person who is notified. This information shall be recorded in their Wildland Fire Investigation Report. Whenever possible, the wildland fire investigator should complete the DNR Evidence Form – Receipt for Property and provide it to the property owner, if known, as soon as practical.
4. When evidence has been identified, to the extent possible, the person, firm, or corporation owning the evidence shall be afforded a reasonable opportunity to view and document the evidence before the investigator takes it into possession or control. The investigator shall document efforts to provide evidence owners a reasonable opportunity to view and document the evidence. The investigator shall include the documentation of such efforts in the Wildland Fire Investigation Report.
5. A person, firm, or corporation viewing or documenting evidence owned by the person, firm, or corporation shall NOT alter, damage, or destroy the evidence. Any damage or change of the evidence shall be noted in the Wildland Fire Investigation Report, identifying the person responsible for the damage or change, and the nature of damage or change.
6. In the event the person, firm, or corporation found to be the owner of the property obtained as evidence, objects in writing to its seizure, DNR must return the evidence within seven days of receipt of the written objection or obtain a court order authorizing the continued possession of the evidence.
7. Upon receipt of a written objection, the DNR wildland fire investigator shall immediately notify their region Senior Wildland Fire Investigator and the Supervisor of the Fire Investigation Unit (FIU).

8. When the item of evidence is used by its owner to conduct business, or to provide an electrical utility service, and the taking of the evidence would substantially and materially interfere with the operation of the business or provision of electrical service, a court order authorizing the seizure shall be required prior to DNR taking possession of the evidence unless the owner of the evidence consents to DNR taking possession.
9. DNR wildland fire investigators may not take possession or control of evidence over the objection of an electric utility company when the item of evidence is not owned by the utility company but has caused damage to property owned by the utility company, absent a court order, unless the investigator or DNR has notified the utility that the investigator intends to take possession of the evidence and provided the utility with a reasonable time to view and document the evidence. An example would be, if a vehicle, not owned by the utility company damages electric utility property, DNR wildland fire investigators would not be able to take possession or control of the vehicle over the utility's objection absent a court order, unless the utility has had notice and a reasonable opportunity to examine the vehicle. However, the wildland fire investigator would work cooperatively with law enforcement to obtain all the necessary information required to complete the wildland fire investigation.
10. For safety purposes, only personnel qualified to work on electrical power supply systems should be involved in the removal of electrical power equipment. In most cases, this will be done by the affected electrical utility company, or a contracted electrical engineer. DNR wildland fire investigators shall not take into their possession or control any item that may be a hazardous material or require special handling requirements. In the event that an item of evidence is found to contain hazardous material, DNR will work cooperatively will the electrical utility to ensure the item will be safely recovered, transported, and stored in compliance with all state and federal safety laws.
11. Additional guidance and direction pertaining to wildland fires and evidence can be found in Chapter two of the DNR Evidence Manual (2.00.060).

9.6 Reporting Requirements

A Wildland Fire Investigation Report (WFIR) will be required on ALL electrical utility involved wildland fires. The lead investigator shall submit the completed WFIR to the region Senior Wildland Fire Investigator which then will be reviewed and routed to the supervisor of the Fire Investigation Unit for approval. All assisting wildland fire investigators shall complete a supplemental wildland fire report, following the same submission and approval process.

At a minimum, the case file for an electrical utility involved wildland fire should contain the following sections:

1. Report
 - a. WFIR
 - b. All assisting investigator reports

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- c. All Subject Matter Expert (SME) reports
2. Logs
 - a. WildCad Log
 - b. 911 Dispatch Log/Recordings
 - c. Incident Commander Fire Report
 - d. Fire Weather Watch
 - e. Red Flag Warnings
 3. Scene
 - a. Fire Origin location map
 - b. Fire perimeter map
 - c. Fire scene drawings/sketches
 - d. Lightning detection maps
 4. Photographs
 - a. Scene photograph log with description
 - b. Evidence photograph log with description
 - c. Any additional supporting photographs
 5. Witness statements
 - a. Contact List
 - b. Statement forms
 6. Property/Evidence
 - a. Property/Evidence Forms
 - b. All laboratory reports
 7. Miscellaneous
 - a. Media coverage
 - b. Any other documents relevant to the investigation

Based on the complexity and circumstances of the investigation, not all the above listed items may be applicable or available. This is intended to serve as a guide to assist the wildland fire investigator as they prepare the case file.

Once the case file has been completed, all electrical utility power line involved wildland fires shall be routed through the DNR Fire Investigation Unit for final review and approval.