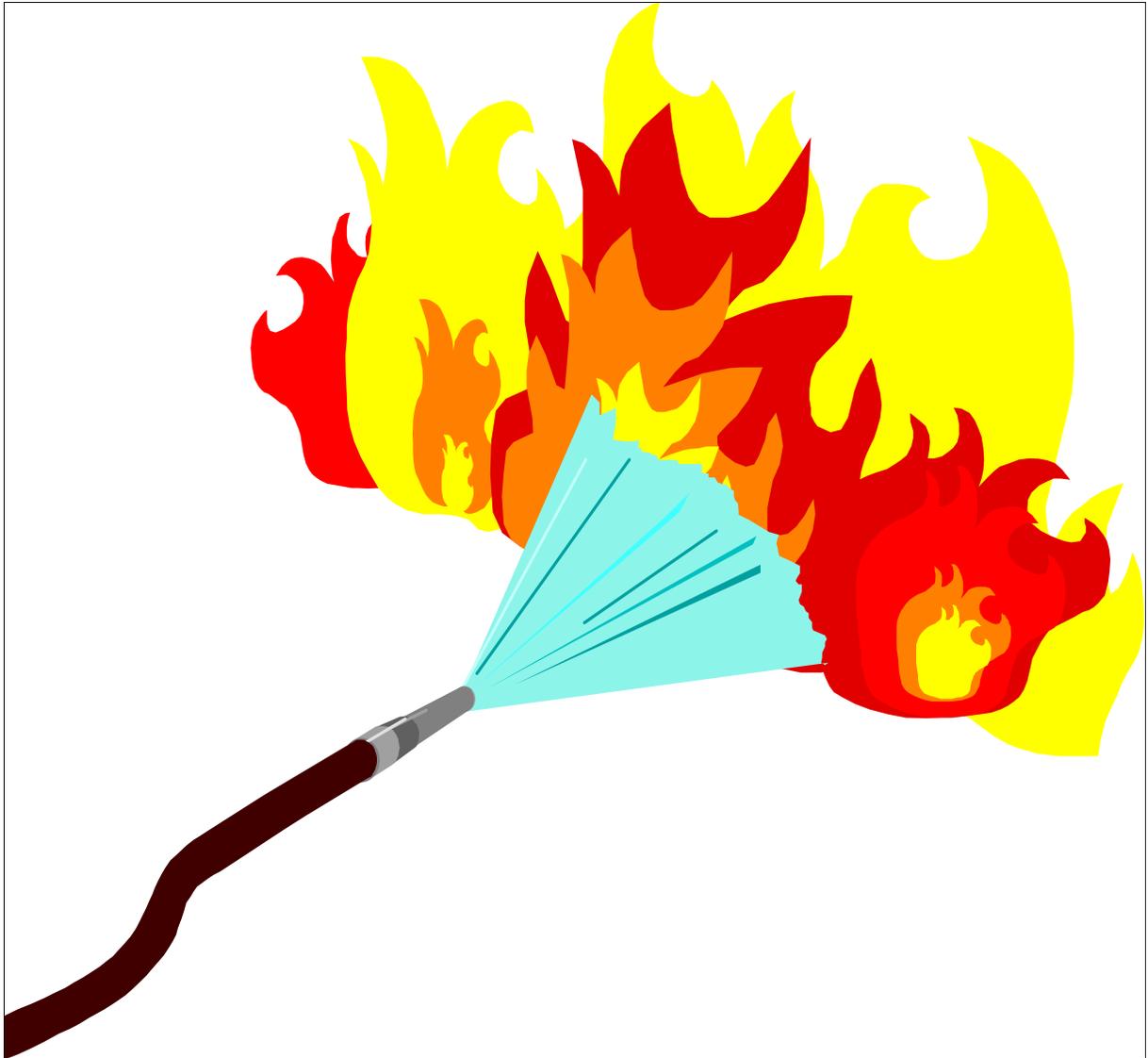




SUBSTATION FIRE FIGHTING OPERATING BULLETIN NO. 17



August 25, 2003



17-1 INTRODUCTION

This Bulletin is to provide BPA employees with guidelines for coping with a fire. BPA employees are not expected to fight fires of major proportions or in dangerous locations.

This Bulletin contains Standards and Guides. Standards are mandatory requirements. Guides are supporting information for the Standards. Standards are in bold print and Guides are in normal print.

The following attachments at the end of this bulletin are Standards.

- **Fire Fighter Orientation**
- **Fire Fighter Orientation Completion Record**

17-2 INCIPIENT STAGE FIRE

In the event of a fire involving BPA facilities, the employee's use of a portable fire extinguisher is not intended to place that individual in a hazardous situation. An incipient stage fire, as defined by OSHA, is a fire which is in the initial or beginning stage and can be controlled or extinguished by portable fire extinguishers. Before deciding to fight a fire, an employee should first ensure that the fire department is being notified, and other employees within the workplace are alerted to the presence of a fire. The employee should NOT fight the fire if EVEN ONE of the following is true:

- If the fire is spreading beyond the immediate area where it started or is already a large fire.
- If the fire could block your escape route.
- If you are unsure of the proper operation of the extinguisher.

17-3 REPORTING FIRES

When reporting a fire, the BPA employee shall:

CALL THE FIRE DEPARTMENT FIRST.

Telephone numbers of local fire fighting agencies shall be posted in **RED** on or near all local exchange telephones in the station. Typically this call would be made to a 911 telephone operator.

NOTIFY THE SYSTEM DISPATCHER.

Inform the Dispatcher of the location and extent of the fire, and the danger it may present to the Power System.

NOTIFY THE CHIEF OPERATOR

17-4 FIRES IN ENERGIZED SUBSTATIONS

When a BPA Substation is involved in a fire, BPA's procedure is:

Under **NO CIRCUMSTANCES** are the responding fire fighters to enter the substation or to start putting any extinguishing agents on the fire until a Qualified BPA Electrical Employee or a Qualified Customer Switchman arrives at the scene and has assured the fire department personnel that it is safe to enter and to start putting any extinguishing agents on the fire.

Once this Qualified Electrical Employee has allowed the fire suppression personnel to enter the substation, this Employee is "in-charge" and his/her directions shall be followed at all times.

Upon arrival at any BPA Substation, the Substation Operator will assume all switching and the control of entry duties and responsibilities.

Before any attempt is made to attack a fire on equipment normally energized at 600 volts or above, the Substation Operator, Qualified Customer Switchman, or other qualified BPA electrical employee shall perform the necessary emergency switching to isolate the burning equipment from the power system with isolating devices. Adjacent circuits may be isolated for the safety of the fire fighting personnel. If the equipment must be isolated at a remote terminal, because of a transmission line pole, voltage or current transformer fire, the System Dispatcher will coordinate de energizing and isolating, if possible.

If personnel, equipment or extinguishing agents must violate the minimum approach distance (for non-electrical) in order to extinguish a fire, a Work Clearance must be issued and protective grounds must be applied as provided in the Accident Prevention Manual.

A Safety Watcher is required:

- When fire fighting vehicles and other associated vehicles are being operated within an energized switchyard.
- During the time the Clearance is in effect.
- When fire fighting needs to be accomplished off of the ground.

Multiple Safety Watchers may be required anytime a qualified BPA electrical employee determines that a Safety Watcher is required.

Accident Prevention Manual Safety Watcher Rule S-3, requirements for Safety Watchers for Non-Electrical Workers, must be adhered to at all times.

The Safety Watcher shall use judgment in requesting adjacent circuits be de-energized for the safety of the fire crew.

17-5 THE FIRE MARSHAL'S RESPONSIBILITIES

The Chief Substation Operator or other designee shall be the Fire Marshal for their assigned Districts and/or work facilities. Fire Marshal responsibilities include insuring good housekeeping practices are followed and keeping the Fire Service and/or local emergency planning committee informed of any changes in storage of chemicals or layout of the substation. Other duties include periodic inspections of work areas for sprinkler systems needing repairs, posting fire evacuation plans, and inspecting fire extinguishers, fire hydrants.

Note: Information and arrangements for field presentations regarding, Fire and Fire Classification, Fire Fighting Methods, and Extinguisher Types and Placement in Substations can be obtained through the BPA Safety Office.

17-6 FIRE FIGHTER ORIENTATION

The Chief Operator will offer a Fire Fighter Orientation every year. A letter to the local fire fighter service and/or emergency planning committee will be written each year by the Chief Operator outlining information provided at BPA's Fire Fighter Orientation. Immediate notification will be made for changes in hazardous material and chemical storage at the substation. Material Safety Data Sheets will be provided by BPA as required by OSHA.

Note: Customer Switching Orientations should include a Fire Fighter Orientation, especially at those locations where the Customer Switchman would arrive well in advance of any Qualified BPA Electrical Employee in an emergency situation. This may require an extension of the switching instructions normally given at these orientations, e.g., including the procedure for the isolating of a transformer bank. Additionally, Qualified Customer Switchmen should also be encouraged to be in attendance at all Fire Fighter Orientations in customer substations given by BPA Substation Operations.

Fire Fighter Orientations shall be conducted at a substation, where practical. Information regarding substation equipment and electrical theory should be kept basic, simplistic and brief and shall include at a minimum:

Electrical Characteristics -- General theory, substation equipment identification, isolating devices, high voltage circuits, control house/low voltage circuits, insulators and conductors, fog versus solid stream or foam.

Substation Familiarization -- Location of station, available fire fighting equipment, oil containment system, available water and foam sources, relay and engine generator houses, other storage buildings within substation, cable tunnels, additional access roads and gates, battery rooms, pressurized gas cylinders. Location of chemicals and toxic hazards present, including electrical equipment that contain polychlorinated biphenyls (PCBs) and sulfurhexafluoride (SF-6) gas that become toxic when burned.

Sulfurhexafluoride (SF-6) gas that has been burned due to normal arc interruption process can produce, among many by-products, a toxic powder residue. When this powder is mixed with water, it becomes highly acidic, and can cause damage to wire insulation and possibly fire hoses. Avoid inhaling or contact with the skin. If touched or inhaled a severe burning sensation may occur and immediate medical attention will be required!

BPA Safety Procedures -- Safety Watching - personnel and vehicles, isolation of equipment, clearance and grounding of high voltage equipment, hard hat rules, conductive devices, minimum safe approach distances, control of entry, and substation security.

17-7 FIRE EXTINGUISHER INSPECTIONS

A thorough check of the extinguisher is intended to give maximum assurance that an extinguisher will operate effectively and safely.

17-7.1 MONTHLY INSPECTIONS

As per OSHA Standard 29 CFR Part 1910.157, monthly inspections require the following checks of portable fire extinguishers:

1. Located in a designated place with no obstructions to access or visibility.
2. Extinguishers should be stored in the upright position.
3. Pressure gauge reading or indicator in the operable range or position.
4. Examine for obvious physical damage, corrosion, leakage or clogged nozzle.
5. Seals and tamper indicators not broken or missing.
6. Operating instruction on name plate legible and facing outward.
7. Determine fullness by weighing or hefting.
8. Date and initial fire extinguisher tag, BPA F5480.04.
9. All servicing/repairs to extinguishers shall be made by or under the supervision of a certified fire equipment contractor. (If a local vender is unavailable, this can be accomplished at the Ross Warehouse.)

17-7.2 ANNUAL MAINTENANCE CHECKS

Annual Maintenance Checks, in addition to the monthly inspection items shall include the following:

1. Make a thorough examination of mechanical parts (operating lever, safety pin, and carrying handle).
2. Date and initial fire extinguisher tag, BPA F 5480.04, with a notation of "Annual Maintenance Check".

Note: Hefting inspection is done to check physical contents of the extinguisher. If unable to determine fullness by this method, the extinguisher must be weighed. This weight is then compared to the empty weight of the extinguisher found on the nameplate.

Fire Hydrants: All fire hydrants should be inspected annually for leaks, corrosion, and operating condition.

17-7.3 SIX YEAR AND 12 YEAR INSPECTIONS

OSHA Standard NFPA 10 states every 6 years the extinguisher will be drained and recharged and inspected. Every 12 years hydrostatic tests shall be performed for dry chemical shells and Halon extinguishers. All repairs to extinguishers shall be made by or under the supervision of a certified fire equipment contractor. (If a local vender is unavailable, this can be accomplished at the Ross Warehouse.)

Non-rechargeable (disposable) fire extinguishers are exempt from 6 and 12 year inspection/testing requirement. They are not to be hydrostatically tested but shall be removed from service no later than 12 years from the date of the manufacture.

17-8 ACCIDENT/INCIDENT REPORTING

To report loss or damage of property due to fire in a substation the Individual Accident/Incident Report (BPA F 5480.01e) must be filled out by the Chief Operator in charge of the Substation. (This is a requirement of DOE.) To meet Operational requirements a written report giving details of events must be submitted. The original should be sent to the Regional Manager with copies to the Field Safety Manager, and a copy maintained at District Headquarters.

17-9 RESOURCES

Safety and Health Program Handbook.
Safety Staff - CF
Substation Operations Group - TOZ
Accident Prevention Manual
Fire Fighters and Electricity Video - Safety Office - CF

ADDENDUM I

FIRE FIGHTER ORIENTATION

The following topics on this page are the required subjects to be covered per Operating Bulletin No. 17, section 17-6, Fire Fighter Orientation. This subject matter along with the 'Example Guidelines for Fire Fighters' on the following pages can provide a relatively complete and thorough Fire Fighter Orientation. The Orientation and Example Guidelines can be used separately or together to meet your individual fire fighter personnel needs.

This orientation shall be conducted at a substation, where practical. Information regarding substation equipment and electrical theory should be kept basic, simplistic and brief and shall include at a minimum:

Electrical Characteristics -- General theory, substation equipment identification, control house/low voltage circuits, high voltage circuits, isolating devices, portable grounds, insulators and conductors, fog versus solid stream or foam.

Substation Familiarization -- Location of station, available fire fighting equipment, oil containment system, available water and foam sources, relay and engine generator houses, other storage buildings within substation, cable tunnels, additional access roads and gates, battery rooms, pressurized gas cylinders (nitrogen, etc.). Location of chemicals and toxic hazards present, including electrical equipment that contain polychlorinated biphenyl (PCBs) and sulfurhexafluoride (SF-6) gas that become toxic when burned.

Sulfurhexafluoride (SF-6) gas that has been burned due to the normal arc interruption process can produce, among many by-products, a toxic powder residue. When this powder is mixed with water, it becomes highly acidic, and can cause damage to wire insulation and possibly fire hoses. Avoid inhaling or contact with the skin. If touched or inhaled a severe burning sensation may occur and immediate medical attention will be required!

BPA Safety Procedures -- Safety Watching - personnel and vehicles, isolation of equipment, clearance and grounding of high voltage equipment, hard hat rules, conductive devices, minimum safe approach distances, control of entry, and substation security.



ADDENDUM II

GUIDELINES FOR FIRE FIGHTERS IN AND AROUND BPA FACILITIES AND POWER LINES

SUBSTATIONS AND SWITCHYARDS

(Note: Qualified Electrical Person denotes BPA Substation Operator, Qualified Customer Switchman, or other Qualified Electrical Employees of BPA)

A. ARRIVING AT THE SUBSTATION

- When responding to a fire located in a Bonneville Power Administration (BPA) Substation, **DO NOT** cut gate locks or in any way make a forced entry into the buildings or switchyard.
- Keep the public away from the area.
- Wait outside the fence or the building until a Substation Operator, Qualified Customer Switchman, or other qualified BPA electrical employee arrives to give you instructions. Only a Chief Operator, Substation Operator, Qualified Customer Switchman, or other qualified electrical employee is authorized to permit entry into a BPA Substation. The qualified electrical person that allows entrance into a substation will be “in-charge” and her/his directions will be followed at all times.
- If a Substation Operator or other qualified electrical person is not present, notify the BPA Dispatcher. Substation Control of Entry signs posted on the front door of the control house and substation switchyard gate(s) will provide the appropriate BPA Dispatcher telephone number.
- While you are in the control house or inside the switchyard you must be escorted by a qualified electrical person at all times.
- Coordinate with the qualified electrical person in-charge in gaining admittance for late arriving firefighters and equipment. This person may wish to assign another person at the gate for this purpose.

B. PERSONNEL, VEHICLES AND EQUIPMENT INSIDE THE SWITCHYARD OR CONTROL HOUSE

- Consider all substation equipment and lines energized with high voltage until informed otherwise.

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- If, in the judgment of the qualified electrical person “in-charge”, the movement of equipment or personnel constitutes an electrical hazard, she/he will assign Safety Watcher(s). A Safety Watcher is a qualified electrical person who knows and understands the electrical hazards involved in energized electrical switchyards. The Safety Watcher will limit the movement of personnel and equipment to prevent electrical contact accidents.
 - Be especially cognizant of vehicle radio antennas as fire fighting equipment is being positioned in the vicinity of energized high voltage equipment. You will be directed by a qualified electrical person or the Safety Watcher to possibly remove the antenna or pull the tip of the antenna down and secure.
 - Do not position fire apparatus, equipment or vehicles under the lines that are coming into or going out of the station. Do not raise any pike poles or ladders. NO metal ladders are to be used inside of the substation fence.
 - Additional safety precautions (work clearances) may need to be taken at times to ensure a safe work area. The Substation Operator, Qualified Customer Switchman, or another electrically qualified BPA employee may need to perform emergency switching to isolate the burning equipment from the power system. This procedure can be quite lengthy at times, but nevertheless, it is absolutely necessary for the safety of all persons.
 - The Electrical Person “in-charge” or the assigned Safety Watcher will assure fire fighters that the equipment in the fire area has been de-energized and will additionally designate safe work boundaries before fire fighters apply any extinguishing agents.

C. APPLICATION OF FIRE SUPPRESSANTS TO ELECTRICAL EQUIPMENT

- Unless it is a life threatening situation, the electrical person “in-charge” or the Safety Watcher will not allow solid streams of water or foam to be applied to electrical equipment until it has been de-energized. Solid streams of water and foam are very good conductors. A safer choice is a fog stream, all the water droplets are separated and there’s no path for the electricity to follow.
- Because electrical equipment that is not involved in the fire may still be energized, treat **all** equipment as energized until informed otherwise by the Safety Watcher or Electrical Person in-charge.
- Follow the directions given by the Safety Watcher or Electrical Person in-charge when applying water on or near electrical equipment. Always maintain a **minimum** of 33 feet between the hose nozzle and the electrical equipment.
- Use only a fine wide spray or fog streams of water. If equipment has been de-energized, foam may also be used. The majority of fires in substation switchyards are oil fires originating from power circuit breakers or transformers. One of the problems encountered with these oil fires concerns a re-ignition caused by the heat of the surrounding steel

maintaining the oil at or above its ignition temperature (approximately 300 degrees F). Using water for cooling is necessary. Electrical equipment containing any polychlorinated biphenyl (PCB) level will be identified. Power circuit breakers in particular can contain sulfurhexafluoride (SF-6) gas, which, when burned, produces a powder residue. In addition to the gas by-products from the burned SF-6, this powder residue is highly toxic if inhaled, and when mixed with water creates an acid that can be hazardous to people and cause damage to wiring insulation.

- The recommended method for preventing re-ignition is to apply a continuous water curtain to the steel in the form of spray of high pressure fog, thus cooling it and reducing the temperature of the oil.
- When in a position too close for safety with a straight stream. A fog nozzle should be used and the fire fighter shall not change the nozzle to produce a straight stream of water.
- Electrical cables are usually located in manholes, cable tunnels, or trenches. Use only a fine spray or fog stream of water or foam. Do not direct a solid stream of water into a manhole, cable tunnel or cable trench.
- Hazards to be considered inside a Control House are AC/DC control relay circuitry for all substation equipment and storage batteries. Most substations house large storage batteries consisting from 24 to 60 individual cells. The voltage on these batteries banks range from 48 volts to 136 volts DC.
- Be aware transmission lines can pass over Control Houses.

WOOD POLES AND CROSS ARMS

(Note: Qualified Electrical Persons denotes BPA Substation Operator, Qualified Customer Switchman, or other Qualified Electrical Employees of BPA like TLM)

- When responding to a pole fire, determine if a qualified electrical person is present. If so, follow his/her directions in applying water to the pole structure or equipment.
- If a qualified electrical person is not present, notify the BPA Dispatcher and give the pole identification. The pole identification will be found on a metal tag approximately 7 feet from the ground. Any pole up or down from where the fire is burning can be identified and the information given to dispatch.
- Always consider electrical equipment on poles to be energized until assured otherwise by an on-site qualified electrical person.
- Wait for the arrival of a qualified electrical person before applying water on or near the wires.

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- If the qualified electrical person determines it is unsafe to spray water on or near the wires due to the voltages on these wires, he/she will request the line be de-energized.
 - Always maintain a **minimum** of 33 feet between the hose nozzle and the electrical equipment unless advised by a qualified electrical person that it is safe to do otherwise. Usually the maximum voltage on any BPA wood pole is 230,000 volts.
 - Due to the varying purity of water, use fine wide spray or fog streams whenever possible. Foam may also be applied if the lines have been de-energized.
 - **Never attempt to cut, move, or in any way touch an electrical wire.** If they are down, keep personnel and equipment well away from them. Secure the area and wait for a qualified electrical person to de-energize the line.

CONCLUSION

BPA has an Accident Prevention Manual that is adhered to conscientiously. Safe work procedures provide maximum protection for personnel working on or in BPA facilities. The safety of all personnel is our primary concern. Therefore, we do not subscribe to, nor do we approve of measures taken to extinguish fires on BPA facilities without the presence of a qualified electrical person.

EMERGENCY PHONE NUMBERS

Bonneville Power Dispatcher
Dittmer Control Center
Vancouver, WA
24 Hours Per Day
1-800-392-0816

BPA District Chief Operator
Name/Location:
Office No:
Home No: (optional)

Bonneville Power Dispatcher
Munro Control Center
Spokane, WA
24 Hours Per Day
(509) 465-1820
(509) 465-1826
1-887-836-6632

BPA () Substation
Monday - Friday - 8:00 AM to 4:30 PM

Phone No:

(Other)



ADDENDUM III

FIRE FIGHTER ORIENTATION COMPLETION RECORD
Substation/Facility where Orientation given:
Date Orientation given:
Fire Department District involved:
Fire Chief's Name:
Number of Fire Fighters in attendance:
Names of others in attendance: (customer switchmen, BPA)
BPA Chief Operator Name:
Presenter's Name:
Length of time of orientation:
Description of orientation: (OB 17, Powerpoint presentation, handouts)
Notes/Special Considerations:



ADDENDUM IV

FIRE FIGHTER ORIENTATION

MATERIALS

This addendum to Operating Bulletin Number 17 includes a PowerPoint Presentation developed by the Substation Operations Functional Team. As an option The PowerPoint Presentation can be used with your annual fire fighter orientations. Each Chief Substation Operator was provided a CD containing the Fire Fighter Orientation presentation. The Substation Operations Group has made the presentation available on the 'Public' drive at (<\\rs1f01\Public\SUBOPS\fire\firefight.ppt>). Anyone with a personal computer can access, copy and print this file. The Substation Operations Group is available to assist in acquiring additional CDs and handouts.