Chapter 10  Health and Safety

This chapter describes existing health and safety conditions in the project area, and how the project alternatives could affect public health and safety.

10.1  Affected Environment

Transmission facilities provide electricity for heating, lighting, and other services essential for public health and safety. If not constructed, operated, and maintained properly, however, these same facilities could pose risks to humans—including electrocution, fire, collision with aircraft and watercraft, and exposure to toxic and hazardous substances. Transmission facilities can also become a target for vandalism, sabotage, and terrorism. BPA designs its facilities to meet safety requirements to prevent or reduce these risks. These measures include maintaining proper clearances between transmission lines and the ground, roadways and vegetation, and preventing inappropriate use of rights-of-way.

10.1.1  Public Health and Safety

Many people live, recreate, and work in the project area along existing transmission lines, access roads, and substations (see Map 1-2 and Section 2.2, Developing Route Segments and Substation Sites). These existing facilities are in rural and heavily populated residential areas, in parks and other recreation areas, in commercial and industrial areas, and in areas used for agriculture and timber harvest. BPA maintains its existing facilities to ensure maximum safety. This includes twice annual inspections by helicopter, and annual inspections by ground crews.

10.1.2  Toxic and Hazardous Substances

Portions of the action alternatives are in rural, undeveloped areas where the risk of encountering unreported hazardous waste sites or unreported contamination is possible but highly unlikely. These sites may include illegal dump sites, illicit drug labs, buried drum sites, unreported chemical spills, abandoned industrial properties, or old landfills. In more developed areas, including urban areas, contaminated sites are generally identified and listed with regulatory agencies.

Three hazardous waste and contaminated sites reported to environmental regulatory agencies (U.S. Environmental Protection Agency [EPA], Washington State Department of Ecology [Ecology], Oregon Department of Environmental Quality [ODEQ], and local health departments) are crossed by one or more of the action alternatives:

- BPA’s Ross Complex: West Alternative
- International Paper Company Mill and Solid Waste Site: Central Alternative
- Reynolds Metals Site: all action alternatives
10.1.2.1  BPA Ross Complex

BPA’s Ross Complex was established on a 200-acre site north of Vancouver, Washington in 1939 and houses one of the control centers for BPA’s transmission system. The West Alternative route enters BPA’s Ross Complex from the north on existing right-of-way, turns east, and follows the existing right-of-way as it leaves the Ross Complex (see Figure 10-1).

The BPA Ross Complex was listed on the National Priorities List (NPL) in 1989 for contamination present in soil and groundwater that included polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP). After completing cleanup actions and implementing institutional controls, the BPA Ross Complex was delisted from the NPL in 1996. Contaminants remain in selected areas, but institutional and engineering controls including clean fill soil caps, and land use restrictions, continue to protect human health and the environment (EPA 2010a).

The BPA Ross Complex has five designated institutional control areas numbered 1 through 5 (see Figure 10-1). Institutional controls are defined as administrative actions taken to reduce the potential for exposure to hazardous substances and may include use restrictions, environmental monitoring requirements, and site access and security measures. Institutional Control Area No. 5 is within existing right-of-way and under an existing access road proposed to be improved.

10.1.2.2  International Paper Company Mill/Solid Waste Site

The former International Paper Company site is a state-listed hazardous waste site near Chelatchie, Washington about 23 miles northeast of Vancouver, Washington. It includes the mill site and adjacent (solid waste site) landfill. A small section of the Central Alternative route crosses the western portion of the former mill site.

International Paper Company operated a plywood mill and sawmill at this site from 1960 until the mill was closed in 1979 (The Columbian 2011). Ecology performed a Site Hazard Assessment (SHA) of the adjacent landfill and placed it on the Hazardous Sites List in 1996. Ecology placed the mill site on the list in 1997.

Ecology uses the Washington Ranking Method (WARM) to estimate the potential threat a site poses to human health and the environment if not cleaned up. Sites are ranked relative to each other on a scale of 1 to 5, with 1 representing the highest level of concern and 5 the lowest. The mill site was ranked 5. The landfill was ranked 2. At the mill site, suspected contaminants in soil are PCBs, petroleum products, and PAHs. At the landfill, confirmed contaminants in soil are PCBs, and suspected contaminants in soil are petroleum products and PAHs. At both sites, suspected contaminants in sediment and surface water are PAHs.

In 1997, the mill property owner hired an environmental contractor to excavate and remove the contaminated soil to an onsite land-farming and bioremediation treatment process facility to reduce contaminants to acceptable levels.
Figure 10-1  BPA Ross Complex
10.1.2.3 Reynolds Metals Company Site

The Reynolds Metals Company (RMC) site is an active NPL or "Superfund" site about 20 miles east of Portland and about 1 mile north of Troutdale on Port of Portland property. The proposed Sundial substation site is on part of this Superfund site, requiring the transmission line route for all action alternatives to cross a portion of it.

Reynolds Metals Company operated as a primary aluminum reduction plant where aluminum was produced from the raw material alumina. The aluminum plant occupied about 108 acres of the 800-acre RMC site. The plant operated from 1941 until fall 2000 when it was closed by its owner Alcoa. The plant buildings were demolished from 2003 through January 2006. The Port of Portland acquired the site from Alcoa in 2008.

The RMC site was placed on the NPL in December 1994. Cleanup of several waste areas began in 2003. Cleanup of fluoride-contaminated groundwater began in 2005. Plant demolition and additional soil cleanup was done between 2003 and 2006.

In 2006, the RMC site was divided into four areas for post-demolition investigation and evaluation of site soil conditions (see Figures 10-2A and 10-2B). Three of these areas could be affected by the project:

- Fairview Farms (location of Sundial Substation [Lots 11 and 12], new line, connector lines, access roads, and non-BPA lines to be removed and/or re-routed [see Figures 4-2A and 4-2B for more project detail])
- Outside the Dike (location of connector lines and access roads)
- East Area (former plant, location of connector lines)

Early cleanup actions at Fairview Farms between 1995 and 2002 included excavating and disposing of 150 tons of debris from four piles to a permitted off-site disposal facility. Cleanup actions within the Outside the Dike area between 1993 and 2001 included the excavation and removal of 93,854 tons of process residue and sediment from the Company Lake portion of this area. Extensive removal actions within the East Area included the main RMC plant. Remedial actions within the northwestern portion of the East Area included the removal of a wooden wastewater pipeline and 28 tons of material.

Groundwater contamination at the RMC site was caused by fluoride leaching from former waste areas at the East Area (former plant) and the Outside the Dike area. Source areas of groundwater contamination were removed during remedial actions between 2002 and 2005. A fluoride-contaminated groundwater plume (northern plume) remained at depths from 30 to 100 feet below ground surface. An extraction/production well system was installed in 2005. The final selected remedy is documented in the 2006 Record of Decision issued by EPA and concurred with by ODEQ. Ongoing remedial action includes operation of the extraction/production well system in a former scrap yard area in the East Area. Since the time of installation, the concentration levels in some monitoring wells near the source areas have begun to show a downward trend.

The post-demolition risk assessment (RA) done in 2006 addressed possible future land use of the area as a mixed-use general industrial complex consistent with existing industrial zoning. The RA considered the potential for soil exposure to future site users: site trespassers,
recreational users, construction workers, excavation/trench workers, and standard occupational workers. The RA’s human health risk assessment concluded that soils within all three areas were within the EPA’s and ODEQ’s acceptable risk range for all contaminants. EPA, the lead agency for the site, conducts 5-year reviews, most recently in 2013, to ensure continued implementation of the Record of Decision.

In 2005, the Port of Portland entered into a prospective purchase agreement with the ODEQ to purchase the property. The agreement was documented and finalized by a Consent Judgment in 2007, which the Port entered into for the purpose of resolving any liability for pre-acquisition releases of hazardous substances on or from the property in return for undertaking certain obligations (primarily implementing the engineering and institutional controls required by the Record of Decision and to run with the property). The Port would also develop the property as an industrial park for commercial and industrial uses consistent with these commitments. Phase I of the Troutdale Reynolds Industrial Park was developed by FedEx with a state-of-the-art distribution center. The Port is currently installing the infrastructure to develop Phases II and III.
Figure 10-2A Reynolds Metal Company Site using Sundial Substation Site—Lot 11
Figure 10-3B Reynolds Metal Company Site using Sundial Substation Site—Lot 12

Legend:
- Tower to be Removed
- Tower to be Rebuilt
- New Tower
- Existing Tower
- New Access Road
- RMS Site Areas-Trousdale Property Boundary

NOTE: See Figure 4-2B for additional project details
10.1.3 Fire

Potential fire hazards in the project area are both natural and human-caused. Fire danger is highest in the summer months because of higher temperatures and lower rainfall amounts. Forest fires have historically occurred in the project area, including the 1902 Yacolt Burn, which was the largest fire recorded in Washington (Wilma 2003). Portions of the action alternatives pass through forest under the jurisdiction of the WDNR or are privately-owned.

Fire protection in the project area is provided by several city fire departments (e.g., Camas, Kelso, Longview, and Vancouver); several fire protection districts in Cowlitz, Clark, and Multnomah counties, and WDNR. Fire protection districts in rural areas are staffed mostly by volunteer firefighters. WDNR provides response to wild land fires within sparsely or unpopulated forest areas not served by fire protection districts. If a wild land fire or other emergency exceeds the capacity of local jurisdictions, the Washington State Fire Service Resource Mobilization Plan is implemented to provide personnel, equipment, and other logistical resources from around the state (WDNR 2010b).

10.1.4 Air and Water Transportation

Aircraft, including private airplanes, helicopters, and commercial aviation, use the airspace above the project area (see Chapter 12, Transportation). Several private airports, airstrips, and general aviation airports are within the project area, including the following: Pearson Field, Grove Field, Green Mountain Airport, and Goheen Airport in Clark County (SWRTC 2008); Southwest Washington Regional airport near Kelso in Cowlitz County; and Portland-Troutdale Airport in Multnomah County. Portland International Airport (PDX) is a regional airport in Portland with domestic and international passenger and freight service.

Because of their height, transmission towers can pose a hazard to aircraft. Any towers taller than 200 feet (generally, some double-or triple-circuit towers and towers used at river crossings) and transmission lines exceeding that height are considered an obstruction by the Federal Aviation Administration (FAA) and may require flashing warning lights for aircraft safety. Shorter towers and line clearances can also be considered obstructions depending on their proximity to airport runways. As obstructions, they must be marked according to FAA rules, which may require installing lighting on each tower and marker balls on conductors across spans (FAA 2000) (see Section 3.7, Obstruction Lighting and Marking).

The Columbia River from Vancouver, Washington to Lewiston, Idaho is a 355-mile-long inland barge channel maintained at a minimum depth of 14 feet. Downstream of the mouth of the Willamette River, the Columbia River is dredged to a depth of 44 feet for large ships. Ten million tons of commercial cargo each year passes by the project where it crosses the Columbia River (Pacific Northwest Waterways Association 2010). The Columbia River also has recreational boating and other watercraft traffic.

10.1.5 Acts of Vandalism, Sabotage, and Terrorism

Although infrequent, vandalism and theft at BPA facilities has occurred in the past. Typical vandalism includes removing bolts and copper grounding straps and other copper wire, and shooting at towers, transmission lines, and insulators. Vandalism and theft at BPA facilities may continue in the future and never be entirely eliminated. BPA estimates theft and vandalism
directly costs ratepayers $500,000 to $1 million per year to replace stolen or damaged equipment (see Chapter 23, Intentional Destructive Acts). Lost revenue and economic losses to electricity consumers from power interruption adds “indirect costs” (Blair 2009).

### 10.1.6 Vegetation Management

Managing vegetation around transmission facilities is necessary for a variety of reasons, including keeping electricity from transmission lines and other electrical equipment from flashing to the ground, preventing trees from falling into towers and conductors, reducing fire risk in the right-of-way, and ensuring access to tower sites. This same vegetation management can potentially harm humans, wildlife or crops unless appropriate practices are followed. Exposure to herbicides, traveling on unimproved roads, felling or topping trees, using sharp tools, machinery and heavy equipment, and working around high voltage transmission lines and transformers can create health and safety risks.

BPA’s vegetation management is guided by its Transmission System Vegetation Management Program EIS (BPA 2002). BPA adopted an integrated vegetation management strategy for controlling vegetation along its transmission line rights-of-way. This strategy involves choosing the appropriate method for controlling the vegetation based on its type and density, the natural resources present at a particular site, landowner requests, regulations, and costs. BPA may use a number of different methods: manual (hand-pulling, clippers, chainsaws), mechanical (roller-choppers, brush-hogs), biological (insects or fungus for attacking noxious weeds), and herbicides (Thompkins 2011). All herbicides sold and distributed in the U.S. must be registered with EPA. This means that EPA must conclude that they can be used without posing unreasonable risks to people or the environment, based on scientific evidence.

BPA’s vegetation management program is based on National Electric Safety Code (NESC) requirements. The NESC requires tree trimming and removal to prevent “…grounding of the circuit through the tree.” Electric contact between a tree and an energized conductor can occur even when the two do not touch. In the case of high-voltage lines, electricity can arc across an air gap. The distance varies with the voltage at which the line is operated. BPA has established minimum distances that a tree can be to a transmission line. The NESC also designates how close a worker can come to energized lines.

### 10.2 Environmental Consequences

General impacts that would occur for all action alternatives are discussed below, followed by impacts unique to each alternative.

#### 10.2.1 Impact Levels

Impacts would be **high** where project activities would cause the following:

- Create a permanent and known health and safety condition

Impacts would be **moderate** where project activities would cause the following:

- Create a known but rare or infrequent health and safety condition
Impacts would be low where project activities would cause the following:

- Create a risk to health and safety that could largely be mitigated

No impact would occur where there is no possible risk to human health and safety.

10.2.2 Impacts Common to Action Alternatives

10.2.2.1 Construction

All construction activities would be guided by site- and task-specific safety plans prepared by BPA and its contractors.

Public Health and Safety

Safeguarding worker and public health and safety during construction is a priority for BPA. BPA would construct this project over a 5-year (60-month) period from 2017 to 2021. The initial phases would involve surveying, and acquiring land in fee and easements. Construction activities would include vegetation clearing on and off right-of-way; road, tower, and substation construction; installing conductors, counterpoise, ground wire, and fiber optic cable; connecting the new line and other existing lines to the new substations; and tower site restoration including reseeding disturbed areas. The completed transmission line could be located in forested land, in sparsely populated areas, or in or near highly populated urban areas. The line would cross highways, local roads, railroads, and rivers and streams.

Heavy equipment, cranes, helicopters, fuels, and blasting materials would be used during construction and installation of towers, conductors, fiber optic cable, counterpoise, ground wire, substations, and access roads. Materials would be stored and possibly assembled at staging areas and helicopter fly yards. The general public would not be allowed in staging areas, helicopter fly yards, or construction areas and would not be at risk of injury. No impacts would occur. By following all safety requirements and implementing mitigation measures, construction activities would create temporary, low impacts to worker health and safety.

The road system used by construction crews would be a mix of public, private, and BPA access roads across public and private land. Access roads would be needed to every tower site, requiring new or widened roads where they do not already exist. Some roads that could be used for construction are currently used for timber harvest activities by private timber companies and WDNR. Residents use other roads for daily commutes within their communities.

Increased traffic on highways and roads during construction could create potential safety issues to the public. BPA and its contractors would adhere to safety standards by developing traffic control plans as required or needed, obtaining permits where required, using flaggers, and properly handling fuels or other hazardous materials. Additional traffic during construction would be temporary. Impacts to public health and safety from increased traffic would be low.

Toxic and Hazardous Substances

Construction activities would require small quantities of toxic and hazardous substances and would generate small quantities of hazardous waste. These substances may include fuels (diesel, gasoline), lubricants, hydraulic fluids, other petroleum products, antifreeze, paints,
wood preservatives, cleaning products, and herbicides. Resulting hazardous or other regulated waste may include used oil, used oily rags, or other used fluids and wastes. BPA would follow strict internal procedures and comply with all health and safety regulations for handling toxic and hazardous substances and hazardous waste. If a spill occurs, BPA would respond and remove the spilled material immediately and restore the area. Because of the small quantities of toxic and hazardous substances generated and the unlikely occurrence of spills, no-to-low impacts would occur.

Unreported (non-BPA) hazardous waste sites may be encountered anywhere along the action alternatives during construction and may pose a potential risk and liability to BPA. If contaminated media (soil, surface water, or groundwater) is encountered during construction, work would be stopped, and a qualified environmental specialist would be contacted to evaluate conditions. The environmental specialist would characterize the nature and extent of contamination to evaluate the threat to human health and the environment. Appropriate remedial actions, including notifications to the appropriate environmental regulatory agencies (EPA, Ecology, ODEQ, and local health departments), and approvals by the appropriate agency would be implemented to reduce the hazards to safe levels so that construction work could proceed.

Because BPA would initiate prompt response and cleanup activities, no-to-low impacts would occur from unreported hazardous waste sites.

**Fire**

Construction activities would require vehicles and equipment that could increase the risk of fire in fire-prone wild land areas. Vehicles would be equipped with fire suppression equipment, including shovels, fire extinguishers, and a water supply. Construction activities would be coordinated with the responsible local fire agency for advisories on fire danger and to establish guidelines and communications. Workers would also follow all guidelines and plans developed by the underlying landowner. BPA and its contractors would develop site-specific safety plans that would include a section on fire safety, required fire suppression equipment, and local fire and emergency contacts (Hoffman 2011). Because BPA and its contractors would use proper precautions and be aware of conditions during construction, impacts would be low.

**10.2.2.2 Operation and Maintenance**

**Public Health and Safety**

Transmission lines can cause serious electric shocks if certain precautions are not taken. These precautions include building the lines to minimize shock hazard. Action alternatives would cross highways, railroads, and rivers. For safety reasons, all existing and new BPA lines are designed and constructed in accordance with NESC. NESC specifies the minimum allowable distance between the lines and the ground, and BPA clearance standards are equal to or greater than NESC. These requirements determine the edge of the right-of-way and the height of the line, that is, the closest point that houses, other buildings, and vehicles are allowed to the line.

For the proposed 500-kV line, standard minimum clearance of the conductor above the ground is 29 feet. The clearance requirement over highways is 45.5 feet; other clearances (railroads, rivers, trees, etc.) are determined on a case-by-case basis. The action alternatives would be designed to meet or exceed these requirements.
BPA does not permit any uses of the right-of-way that are unsafe or might interfere with constructing, operating, or maintaining the transmission facilities. These restrictions are part of the legal rights BPA acquires for its transmission line easements. Because land use restrictions established through easements with landowners and NESC requirements would minimize hazards from operations of the line and substations, impacts would be low.

Vehicles and helicopters are used to perform required tasks along the line, roads, and at substations. Activities include safety inspections and inspections for encroachments, repair, and vegetation management. Similar to construction, the general public would not be allowed in areas where maintenance activities are occurring and would not be at risk of injury. No impacts would occur. By following all safety requirements and implementing mitigation measures, maintenance activities would create temporary, low impacts to worker health and safety.

Maintenance vehicles would travel along the same road system used for construction. Increased traffic on roads because of sporadic maintenance activities would be negligible and subsequent impacts to public health and safety would not occur or would be low.

Unauthorized access or trespass could increase the risk of fire, accidents, and illegal dumping, which could affect public health and safety. Because BPA would use signs, locked gates at some access roads, and otherwise limit access to the right-of-way, impacts to public health and safety from unauthorized public access and use would be low.

**Toxic and Hazardous Substances**

Impacts to public health and safety from toxic and hazardous substances used during operation and maintenance of the transmission line and substations would be the same as for construction.

Some equipment at the new substations may contain diesel and other types of oil, including gas circuit breakers that contain small amounts of hydraulic oil (see Chapter 3, Project Components). Any oil-containing equipment would be designed with proper containment and spill control devices as required. BPA would prepare a site-specific Spill Prevention Control and Countermeasures (SPCC) plan for the new substations if regulatory volumes for oil are met and if it is determined that the substations are located in areas where there is drainage connectivity to waters of the U.S. These plans are specific to each substation and include the location of oil-containing equipment, volume of oil contained in the equipment, spill containment and controls, and the location and types of spill response equipment. Spills, if they occur, would be promptly cleaned up. No-to-low impacts from oil-containing equipment would occur because of containment, controls, and response actions. Impacts, if any, would be temporary because response would likely be quick and effective.
Fire

BPA follows its Transmission System Vegetation Management Program to maintain safe clearances between vegetation and transmission lines in accordance with NESC requirements. These strict guidelines also prevent fires that could occur from electricity arcing from conductors to treetops or from trees (danger trees) falling into the conductors. Trees that need to be cleared from the right-of-way and any that could fall into the line (danger trees) for various reasons are marked and removed. Impacts would be low because the right-of-way would be maintained with safe clearances and distances in accordance with BPA’s Transmission System Vegetation Management Program and NESC requirements.

Routine maintenance on transmission facilities is typically done in the warmer months when fire danger can be high. All maintenance vehicles are equipped with fire safety equipment. BPA would follow all fire safety requirements that may be in place by large public or private commercial landowners or managers, including WDNR, PacifiCorp, Sierra Pacific Holding Company, Weyerhaeuser Columbia Timberlands, and Weyerhaeuser Company. For these reasons, impacts would be low.

Air and Water Transportation

A single-circuit 500-kV tower would average between 120 and 150 feet tall, depending on terrain and right-of-way configurations along each action alternative. The tallest towers at the Columbia River crossing (there are six existing transmission lines that cross the river at this location) could be a little over 305 feet tall. This additional height would be required to keep conductors high enough over the river to allow for river traffic under the line. FAA regulations generally prohibit aircraft from flying below an elevation of 500 feet. Most towers and conductors would be less than 500 feet tall except in areas where the new line might cross steep canyons. Near airports and flight paths, the FAA may require BPA to add obstruction lighting (see Section 3.7, Obstruction Lighting and Marking). BPA is coordinating with the FAA and most towers are designed and would be constructed in accordance with FAA guidelines (FAA 2000). For those taller towers at the Columbia River crossing that are closer to the Troutdale and Portland International airports, and taller towers at the Cowlitz River crossing, BPA is working closely with FAA on their review of the project design. Input from pilots would also be sought as required by the FAA review process. As mentioned, obstruction lighting would be considered in the review; also, possible flight pattern changes. Because of this close coordination with the FAA, safety impacts to air transportation would be low-to-moderate.

Columbia River crossing towers would be placed on a high point in the river bottom at Lone Reef. This location is not in the river channel or otherwise in the navigable portion of the river, which would avoid water transportation safety issues (see Chapter 12, Transportation). BPA would notify the United States Coast Guard (USCG) and the Corps and construct towers in accordance with USCG and Corps guidelines. BPA would obtain a Section 10 permit from the Corps and adhere to marking requirements of the USCG and the Corps. A Section 10 permit is required for work in, over, or under navigable waters of the U.S. Because the project would not place towers within the navigable portion of the Columbia River, no-to-low safety impacts would occur to commercial and recreational river traffic.
Acts of Vandalism, Sabotage, and Terrorism

Any vandalism or theft at the proposed BPA facilities would have the potential to compromise the safety of equipment and utility workers, causing electrocution, fires, and possibly disrupting power. However, these risks are extremely low since the more frequent occurrences are minor acts of vandalism or theft that are quickly repaired and have little to no effect on transmission facility operations or worker safety, and major acts of vandalism, theft, sabotage, or terrorism are rare (see Chapter 23, Intentional Destructive Acts). In addition, BPA uses helicopters to patrol and inspect the 15,000-mile federal transmission system in the Pacific Northwest. Helicopter inspection of the new line would occur twice a year. Helicopter teams look for damaged insulators, damaged support members, washed-out roads, hazardous vegetation, encroachments and problems indicating that a repair may be needed. Aerial inspections are typically followed by annual ground inspections for each line. BPA follows NERC guidelines for security including the reporting of threats and incidents.

The risk from theft, vandalism, or acts of sabotage and terrorism would be low-to-moderate. If some acts of sabotage and terrorism occur, they could create significant damage and power disruption, but the possibility of such acts causing catastrophic results is remote given past experience and routine inspections. Damage from theft, vandalism, or acts of sabotage and terrorism, if any, would be temporary. Damage would be repaired and power restored as quickly as possible.

Vegetation Management

Vegetation would be managed along existing and new rights-of-way for safe operation of the line and substations and to allow access to the transmission line. Any action alternative would need continual vegetation maintenance because of its location west of the Cascade Mountains where the climate is conducive to rapid and dense vegetation growth.

The action alternatives would cross public and private land on existing and new rights-of-way that would require vegetation clearing. Incompatible vegetation such as trees would not be allowed to grow within the transmission line right-of-way unless the trees are in deep canyons or steep valleys. Tall (stable or unstable) trees that grow outside of the right-of-way that are considered a present or future hazard to the line and could fall into, grow into, or bend into the line would also be removed. In deep valleys with sufficient clearance between the tops of the trees and the conductors, trees could be left in place. At tower sites, all trees, snags, brush, and stumps (more than 22 inches in diameter) would be felled and removed, including root systems, from a 50-foot by 50-foot area (see Section 3.11, Vegetation Clearing). Cleared vegetation would be shredded and scattered onsite, composted in the right-of-way, or hauled off site using project access roads.

Workers using manual and mechanical methods for vegetation control are subject to accidents involving falling trees, heavy machinery, chainsaws, or moving over rough terrain. Workers would be trained to use heavy machinery and chainsaws and would be equipped with all appropriate personal protective equipment necessary for each task and piece of equipment. BPA would follow strict standard safety procedures and all regulations regarding worker safety. The general public would not be allowed in areas where vegetation management is occurring and would not be at risk of injury.
The application of herbicides may expose workers if handled carelessly. Workers would be licensed as an applicator in the respective state either by the Washington State Department of Agriculture (WSDA) or the Oregon Department of Agriculture (ODA). Workers would be trained to apply herbicides and use application equipment and equipped with all appropriate personal protective equipment necessary for each task and piece of equipment. BPA would strictly follow standard safety procedures and all regulations regarding worker safety and would be guided by its Transmission System Vegetation Management Program EIS (BPA 2001).

The general public may be exposed to herbicides through drift or spills. BPA notifies known landowners when a vegetation management or herbicide project is being planned and scheduled to allow for responses back to BPA with concerns, questions, or directives for herbicide spraying on their property. Landowner response might include information to help BPA determine appropriate application methods and mitigation measures (such as herbicide-free buffer zones around springs or wells; or organic food farms, aquaculture facilities, or other sensitive areas). When landowners request that herbicides not be applied on their property, BPA has complied with those requests, and works with property owners to strategize non-chemical ways to deal with vegetation hazards on the right-of-way (i.e., noxious weed management plans, replacement vegetation efforts) that works for both the landowner and BPA.

To avoid impacts to domestic water supply wells and other domestic water sources, BPA would strictly follow the guidelines set forth in its Transmission System Vegetation Management Program including maintaining adequate buffers and herbicide-free zones around any potential water sources (see Chapter 15, Water).

BPA continues to fine tune vegetation efforts by communicating intended maintenance practices to landowners and providing an opportunity to respond and help design vegetation management techniques consistent with reliable transmission lines and current landowner practices on managing their land. Site-specific vegetation management plans are created to consider different land management efforts and techniques on different parcels of land, incorporating comments and suggestions from property owners/managers to ensure vegetation is managed in a manner acceptable to both parties.

Because BPA would implement effective controls according to BPA’s Transmission System Vegetation Management Program EIS and is committed to working with existing landowners to accommodate their concerns and needs, impacts would be low.

**Extreme Weather Events**

Extreme weather events, such as wind, ice, etc., are rare in BPA’s service territory, but can occur and could cause a lattice steel tower to fail. Because lattice steel towers are connected to each other with conductors, if one tower fails it puts stresses on surrounding towers, which can sometimes cause nearby towers to collapse. BPA uses tower designs that help prevent this cascading effect from occurring.

Towers are designed to take some longitudinal loading, which occurs either when a wire breaks or a tower fails. This limits potential damage to only a few towers. The lattice-steel towers are designed to withstand 120 mph winds, which can be created by tornadoes, microbursts and downbursts.
On average 800 to 1,000 tornadoes occur within the contiguous U.S. each year. For a 30-year period (1950-1980) the total number of reported tornadoes was recorded and compiled on a 1 degree latitude by 1 degree longitude (1 degree square contains about 4,000 square miles) map (Wong 2009). In Washington and Oregon, 53 tornadoes were recorded over this period, which is quite low compared to other states. Another study observed that over a 63-year period (1916-1978), 86 percent of tornadoes were scaled as F2 or less (Wong 2009). The F scale, FPP, was developed to categorize tornadoes by their intensity and size. A class F2 has a gust speed range between 113 mph and 157 mph. The economics of designing for the higher gust speeds to prevent a rare event is impractical and would increase rates paid by customers.

River crossing towers are designed to higher standards because they are critical to the system. These towers are designed with an additional 20 percent overload (factor of safety) for reliability.

To help prevent trees from falling onto the transmission lines during extreme weather, trees considered a danger to the transmission line are removed (see Section 3.11, Vegetation Clearing). Also, breakers in the substations keep the power from staying on in the event of a downed transmission line.

Icing events can occur in the Northwest. Washington and Oregon typically have between 0.25 inches and 0.5 inches of radial glaze ice occur every 50 years, depending on the geographic area. The Columbia Gorge can have glaze ice up to 1.25 inches thick. BPA uses an extreme icing load case that is two times the 50-year icing amounts.

Though BPA cannot design for every conceivable loading combination, design standards cover a high probability of events that are likely to occur within the area. If an extreme weather event occurred in an area occupied by the proposed transmission line, nearby residents and others close to the affected towers could be at risk from the physical parts of a tower collapsing, and power disruption. Automatic systems at substations would de-energize the lines, reducing the potential risk of injury from energized lines. The transmission line would be on a cleared right-of-way where buildings and other structures are not allowed, reducing the risk of damage to occupied residences and other buildings. Any potential damage from extreme weather events would be temporary, but could include power loss (see also Chapter 23, Intentional Destructive Acts). The towers and conductors would be repaired and power restored as quickly as possible. Because a new transmission line would create a known but rare or infrequent risk to public health and safety during an extreme weather event, impacts would be moderate.

10.2.2.3 Sundial Substation Site

The Sundial substation site (Lots 11 and 12), the end of Segment 52 south of the Columbia River, and connector lines between Lots 11 or 12 and BPA’s existing Troutdale Substation would be constructed within three areas of the RMC site (see Section 10.1.2.3, Reynolds Metals Company Site). The post-demolition RA human health risk assessment conducted in 2006 concluded that soils in the three areas were within the EPA’s and ODEQ’s acceptable risk range for all contaminants. Regardless, special care may need to be taken during excavation for the substation and towers. Before construction work would begin, EPA and ODEQ would be notified and plans would be in place to address and mitigate any known or potential areas of contamination that may be encountered. Because information about known contaminants is available for the three sites, debris and contaminated soil has been removed, and the existing health risk levels are considered acceptable by EPA and ODEQ, impacts would be low.
10.2.3 Castle Rock Substation Sites

The impacts on public health and safety from the substation sites near Castle Rock would be the same as those listed in Section 10.2.2, Impacts Common to Action Alternatives.

10.2.4 West Alternative and Options

The West Alternative includes 600 feet of improved access road within Institutional Control Area No. 5 of BPA’s Ross Complex (see Section 10.1.2.1, BPA Ross Complex, and Figure 10-1). New towers (towers 25/110 and 25/111) would be constructed nearby. Road improvement would typically include blading the existing road and applying additional rock if needed. Because of this site, BPA would not do any blading and would only add rock to the road surface. For towers, BPA would position temporary tower disturbance areas so that they did not interfere with the site. During construction and maintenance activities, BPA’s environmental specialist at the Ross Complex would be notified of these activities and alerted to any changes. EPA and WDOE would be notified of the proposal and BPA would carry out any recordkeeping requirements as required. As long as the existing cap at Institutional Control Area No. 5 is not disturbed during construction or maintenance activities, there would be no impact to the site. Where the West Alternative shares Segment 52 (crossing the Reynolds Metals site) with other alternatives, it would have a low hazardous substance impact, the same as the Sundial substation site.

10.2.5 Central Alternative and Options

The Central Alternative includes a portion of Segment 28, east of Amboy and Yacolt, and one tower (Tower 28/9) on the western edge of the former International Paper Company Mill site (see Section 10.1.2.2, International Paper Company Mill and Solid Waste Site). This location is likely not within areas potentially contaminated by prior mill operations. Available information on the International Paper Company from the Department of Ecology has been reviewed. The level of impact at this location would be low because previous assessments indicated limited contamination, the contaminated soils have been removed, and the proposed route largely avoids areas of the mill site where historic operations occurred. In any case, the site would be investigated further and would be mitigated if the Central Alternative is selected to be built. Where the Central Alternative shares Segment 52 (crossing the Reynolds Metals site) with other alternatives, it would also have a low hazardous substance impact.

10.2.6 East and Crossover Alternatives and Options

The impacts on public health and safety from the East Alternative and the Crossover Alternative would be the same as those listed in Section 10.2.2, Impacts Common to Action Alternatives. Where these alternatives share Segment 52 (crossing the Reynolds Metals site) with other alternatives, it would also have a low hazardous substance impact.
10.3  **Recommended Mitigation Measures**

Mitigation measures included as part of the project have been identified (see Table 3-2). BPA is considering the following additional mitigation measures to further reduce or eliminate adverse public health and safety impacts by the action alternatives. If implemented, these measures would be completed before, during, or immediately after project construction unless otherwise noted.

- Notify the USCG and their Notice to Mariners of the planned construction schedule for building the line across the Columbia River.
- Notify property owners and adjacent landowners of the type and frequency of potential herbicide application to avoid conflicts, such as chemical applications next to organic farms or similar uses.
- Carry fire suppression equipment in all vehicles and follow all fire safety requirements that may be in place by large public or private landowners, including WDNR.
- Continue to be in contact with the Reynolds Metals Site Manager at EPA and the Environmental Engineer at Oregon DEQ. As the agreements for the Reynolds Metals Superfund Site dictate, BPA will fully comply with all requirements during both construction and operation and maintenance.

### 10.3.1 Unavoidable Impacts

Constructing and maintaining transmission lines, substations, and access roads include some activities that increase the risk of injury to workers. Workers would follow all required safety requirements and precautions; however, accidents may still occur. Likewise, during some construction and maintenance activities, minor increases in traffic accident risk due to additional traffic on area roads may occur. Although infrequent, acts of vandalism and sabotage would likely continue to occur with varying impacts to the perpetrator, BPA personnel who respond to these emergencies, and the general public.

### 10.3.2 No Action Alternative

If the project were not built, the health and safety impacts related to the proposed project would not occur. However, the already existing health and safety conditions in the project area would continue to present health and safety risks to individuals in the area. In addition, because reinforcement of the BPA transmission system would not occur under the No Action Alternative, this alternative could eventually lead to diminished reliability of the existing transmission system as loads continue to grow. If this eventually leads to brownouts and possibly blackouts, it could disrupt essential public safety services that rely on adequate and continuous electrical power.