3.14 NOISE, PUBLIC HEALTH, AND SAFETY

3.14.1 Affected Environment

Transmission lines provide electricity for heating, lighting, and other services that make important contributions to public health and safety. Outside temperatures fall well below freezing many days and nights of the year in the project area, and electric heat is the only source available for many homes. Reliable electric heat is an important public health service supplied by the existing system and proposed additions to that system. Potential health and safety concerns associated with electrical transmission facilities were raised during scoping.

The existing Okanogan PUD transmission and distribution system supplying power to the Malott, Loup Loup, Twisp, and Winthrop Substations includes a 115-kilovolt (kV) transmission line from Okanogan to Twisp and a 115-kV tap to the Okanogan County Electric Cooperative's (OCEC's) Winthrop Substation from Twisp; substations at Okanogan, Malott, Loup Loup, and Twisp; and a distribution system operated at 13.2 kV and below that serves the Malott, Loup Loup, Twisp, and that part of the Methow Valley within the PUD service area not served by the Pateros Substation. That system supplies power to about 6,004 customers as of December 1, 2004, and carried a record peak load of 34 megawatts (MW) in January 2004, of which approximately 17 MW was consumed by the OCEC.

These components all emit some noise. Substations are lighted for security (but only when personnel are present) and add to overall illumination in the Twisp, Malott, and Okanogan areas. These components also emit some forms of electric and magnetic fields (EMF). Wooden structures in service now in both transmission and distribution systems are treated with pentachlorophenol (Material Safety Data Sheet, Appendix F). The existing system is subject to damage from wildfire, especially the section of the Loup Loup 115-kV transmission line that passes through forested areas, including but not limited to a portion of the Okanogan National Forest. Finally, the PUD and other workers must work with and around these transmission and distribution lines while they are energized, posing a potential health and safety risk. Noise, EMF, potentially hazardous material use, wildfire potential, and worker safety are all discussed further below.

During scoping, the following issues were raised regarding noise, public health, and safety:

- Rebuilding the existing Loup Loup power transmission line while the existing line is energized increases risk to transmission line construction personnel.
- Building a new transmission line could potentially result in EMF-related health hazard to nearby residents.
- Chemicals used to treat transmission line structures could pose a health hazard.
- The use of herbicides to treat noxious weeds could affect humans (forest and farm workers).
- Accessing the proposed Gold Creek Substation site from State Highway 153 could be a safety hazard for PUD employees and other people driving on State Highway 153. (Note: This substation location was dropped and a new substation location without hazardous access was chosen, so this is no longer an issue.)
- Construction of new roads along the Pateros/Twisp transmission line route may attract off-highway vehicle use that could result in adverse noise effects.
- Construction activities, increased access, and use by off-highway vehicles have the potential to increase fire risk and fire control requirements.

- Reliance on only the Loup Loup transmission line for Methow Valley electricity could result in blackouts in the event of a large-scale forest fire.
- Fires caused by transmission line failures in remote areas may be difficult to respond to.
- Replacing the Loup Loup transmission line while electricity is being transmitted increases the potential for starting a forest fire during construction.

3.14.1.1 Noise

Overview

Sound is typically described using the decibel (dB) scale, a logarithmic rating system that accounts for large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 A-weighted decibels (dBA). A 70-dBA sound level, for example, sounds twice as loud as a 60-dBA sound level. Table 3.14-1 shows noise levels expressed in dBA for various common sources. Factors affecting potential noise impacts include distance from the source, frequency of the sound, absorbency of the ground, the presence of obstructions, and the duration of the sound.

Audible noise levels vary in time. Statistical descriptors, known as exceedence levels (L levels), have been developed to account for fluctuating sound levels. L levels refer to the A-weighted sound level that is exceeded for a specified percentage of time. L_{50}, for example, refers to the sound level exceeded 50 percent of the time and represents a median level (Bonneville Power Administration [BPA], 2003a).

Transmission line corona, the partial electrical breakdown of the insulating properties of air around the conductors of a transmission line, can produce audible noise. This type of noise is typically characterized as a hissing, crackling sound that, under certain conditions, is accompanied by a hum (BPA, 2003a). Audible noise from transmission lines is most noticeable when conductors are wet, which may occur during periods of rain, fog, snow, or icing. Audible noise levels from transmission lines also vary based on the voltage of the line. BPA, measuring transmission noise at the edge of existing rights-of-way (ROWs) for 230-kV lines and a short section of 500-kV line, identified median (L_{50}) levels of about 44 dBA and 50 dBA, respectively (BPA, 2003b). Measurements were not taken of a 115-kV line, which is the voltage at which both the current Loup Loup transmission line and all proposed alternative transmission lines would be operated.

Audible noise produced by an electric substation depends on the equipment used in the substation. The main source of audible noise produced by substation equipment (not the connecting transmission lines) is generally associated with transformers used to step transmission voltages down to distribution levels. Substation noise at existing substations meets Okanogan County specifications for the conditional use permit (CUP) under which they are operated.

Regulation

The Washington Administrative Code (WAC) identifies maximum permissible environmental noise levels for properties based on their Environmental Designation for Noise Abatement (EDNA) (WAC 173-60-040). Permissible noise levels are based on the EDNA of both the noise source and the receiving property. Transmission lines, which are classified as industrial property (Class C EDNA), may cause a maximum permissible noise level of 60 dBA to intrude into residential property during daytime hours (7 a.m. to 10 p.m.) (BPA, 2003b). This level is reduced to 50 dBA during nighttime hours (10 p.m. to 7 a.m.). Noise from electrical substations is exempt from the 10-dBA nighttime reduction (WAC 173-60-050 [2] [a]). Sounds created by installation or repair of essential utility services are exempt from the daytime maximum permissible noise level standards (WAC 173-60-050 [1] [e]).

Table 3.14-1. Common Noise Sources and Sound Levels

Noise Source or Effect	Sound Level, dBA[1/]
Threshold of pain	128
Rock-and-roll band	108
Truck at 50 feet	80
Gas lawnmower at 100 feet	70
Normal conversation indoors	60
Moderate rainfall on foliage	50
Refrigerator	40
Bedroom at night	25
Hearing threshold	0

[1/] Decibels (A-weighted)
Source: BPA, 2003b.

Existing Conditions

Background levels of existing audible noise in the project area vary based on a number of factors, including existing land uses, weather conditions, and whether there is traffic or other human activity nearby. Land use in the project area is discussed in Section 3.9, Land Use.

Traffic is the primary source of human noise generated in much of the project area. Light automobile traffic at 100 feet has a typical sound level of 50 dBA. A heavy truck at 50 feet has a typical sound level of 80 dBA. Average sound levels due to line sources such as traffic decrease with distance from the road at a rate of 3 to 4.5 dBA per doubling of distance from the road.

Along the alternative routes of the proposed 115-kV transmission line, existing ambient noise levels depend on land use and on whether there is an existing transmission line. Background levels of ambient noise along undeveloped routes would depend on ambient conditions such as wind, rain, or nearby traffic or other human activity. For example, levels associated with rain on foliage may be up to 50 dBA (Table 3.14-1). Audible noise from existing lines along the proposed corridors depends on the voltage of the line. Median levels during foul weather at the edge of existing ROWs are about 44 dBA for 230-kV lines and 50 dBA for a short section of 500-kV line (BPA, 2003b).

Noise near existing substations also depends on the surrounding land use and the equipment in the substation. Audible noise produced by substation equipment (not the connecting transmission lines) is generally associated with transformers in a substation. The existing Okanogan, Malott, Loup Loup, and Twisp Substations include industry-compliant 115-kV transformers that will transmit about 50 to 55 dBA to a point 100 feet from the transformer (U.S. Army Corps of Engineers [Corps], 1995).

3.14.1.2 Electric and Magnetic Fields

Overview

Transmission lines, like all electrical devices and equipment, produce EMF. Current, movement of electrons in a wire, produces the magnetic field. Voltage, the force that drives the current, is the source of the electric field. EMF strength depends on the design of the line and on the distance from the line. The strength of the field decreases rapidly with distance. EMFs also occur naturally, caused by the weather and the earth's geomagnetic field.

EMFs are found around any electrical wiring, including household wiring and electrical appliances and equipment. Electric field strength is measured in volts or kilovolts per meter (kV/m). The electric-field strength from wiring and appliances located within homes is typically less than 0.01 kV/m. Fields of 0.1 kV/m and higher, however, can be found very close to some appliances, such as electric blankets.

Magnetic fields are measured in units of gauss (G). A typical home has a background magnetic field level (away from electrical appliances and home wiring, etc.) that ranges from 0.5 milligauss (mG) to 4 mG, with an average value of 0.9 mG. Magnetic fields decrease with distance. Fields of 10s or 100s of mGs can be present close to household appliances. Unlike electric fields, magnetic fields from outside power lines are not reduced in strength by trees and building materials, though they are reduced by distance and are insignificant more than 100 feet from the edge of the ROW (U.S. Environmental Protection Agency [EPA], 2002).

Regulation

Currently there are no established national or state of Washington standards regulating the production of EMF from electric transmission facilities.

Transmission Lines

Magnetic fields within transmission line corridors constantly increase and decrease for a variety of reasons. If electric loads on a line increase, magnetic fields also increase. Magnetic fields are typically greatest in winter months when electrical demands are highest. Operational, meteorological, and line design factors also affect magnetic fields. Fields are higher when the line is physically lower (closer to the ground), either because of design or because of higher temperatures. Because the voltage on transmission lines is relatively constant, the electric field strength is dependent primarily on height above ground, and is more constant than magnetic field strength (BPA, 2003b). As a result, there is some uncertainty involved in predicting exact electric and magnetic field strengths. It is, however, possible to estimate EMF strengths for specific transmission line corridors based on maximum voltage and load and minimum height.

According to previous studies (BPA, 1994 as presented in National Institute of Environmental Health Sciences [NIEHS], 2002), typical magnetic fields from a 115-kV line average around 6.5 mG at 50 feet, decreasing to about 1.7 mG and 0.4 mG at 100 feet and 200 feet, respectively. Recent studies of the PUD's existing Brewster 115-kV electric transmission line, which has a similar load and configuration to the new proposed transmission line, found that magnetic fields were at background levels at a distance of 25 feet from the line (Duke Engineering, 1999). The transmission line ROW would be 50 feet on either side of the new line and along the existing ROWs.

Possible health concerns associated with electric and magnetic fields have included childhood and adult cancers. The issue of whether there are long-term health effects associated with transmission-line fields is controversial. Several studies have been conducted and are summarized in the NIEHS publication, *EMF: Electric and Magnetic Fields Associated with the Use of Electric Power* (June 2002). The publication concludes: "Some studies have found evidence that suggests a link between EMF exposure and both leukemia and brain cancer, whereas other studies of similar size and quality have not found such associations (page 22)."

3.14.1.3 Hazardous Substances

Potential hazardous substance issues raised during public scoping for this project include concerns about the chemical treatment of wooden utility structures and the use of herbicide treatments to manage ROW vegetation.

Utility Structures

Wood utility structures, which would be required under all of the action alternatives, would be treated with pentachlorophenol. The selected manufacturer would conduct this treatment prior to delivery to the project site. The Materials Safety Data Sheet (MSDS) for pentachlorophenol-treated wood is found in Appendix F.

Right-of-Way Vegetation Management

The PUD manages vegetation on its ROWs and substation sites to ensure that electricity from lines or equipment cannot arc to nearby vegetation and cause an outage, fire, or injury to maintenance crews and the public. Three techniques are used to control vegetation: manual (hand-cutting with chainsaws, for example), mechanical (big brush-cutters and mowers), and chemical (herbicides). On Federal lands, the PUD has an existing special use permit that allows limited herbicide use at the Loup Loup Substation. Where necessary, herbicides permitted by the state of Washington could be used along ROWs and access roads to control invasive exotic plants. If herbicides are used, they would be applied by a licensed operator either as a contractor or as an employee of the PUD.

Operation

The PUD will develop a Spill Prevention Plan that will identify all state or Federal listed toxic substances used during operation of the selected alternative if an alternative with a new substation or with temporary power generation is selected. This plan will identify materials, locations, duration of storage, and application.

3.14.1.4 Fire

Fire is part of the natural landscape on the east slope of the Cascades (Everett et al., 2000). Fuels concentrations have increased dramatically in the last 50 years in many forested areas, raising the probability of higher fire intensity and higher rates of tree mortality and soil damage. This also has raised the probability of damage to the Loup Loup transmission line where it crosses forested lands.

The climate of the project area is arid and mild with rainfall of less than an inch on average received per month from June through October (*Omak-Okanogan County Chronicle*, 2003). Fires in this region tend to be hotter and larger during the dry summer months.

Large trees adjacent to the transmission line ROWs pose a threat if they blow into transmission lines and catch fire through direct contact, or ignite surrounding vegetation. Within the forested portions of the project area numerous snags exist in proximity to the existing and proposed transmission line ROWs (see Section 3.8). Finally, vegetation, if allowed to become overgrown, may grow into or fall on transmission lines. This poses an additional risk of fire due to direct contact, and also may cause power outages.

3.14.2 Environmental Effects

This section assesses the potential noise and public health and safety effects associated with the Methow Transmission Project. The following discussion is divided into seven sections. The first section discusses the indicators and significance criteria used to assess the potential effects of the proposed action and the alternatives. The following five sections assess the direct and indirect effects of the proposed project on noise, EMFs, hazardous substances, fire, and security and public safety, respectively. The seventh and final section discusses the cumulative noise and public health and safety effects associated with the proposed project.

3.14.2.1 Evaluation Criteria

WAC (WAC-173-60) noise regulations were used as criteria to assess the effects of the transmission line alternatives on noise. The Code specifies noise limits according to the type of property where the noise would be heard (receiving property), as well as the land use of the noise source. Transmission lines are classified as industrial sources and daytime noise limits are 60 dBA in residential neighborhoods, 65 dBA in commercial areas, and 70 dBA in industrial areas. At night (10 p.m. to 7 a.m.), maximum permissible noise levels decrease by 10 dBA. Accordingly, a noise effect would be considered significant if sustained noise levels from transmission line alternatives exceed these existing state standards. Exemptions from daytime (7 a.m. to 10 p.m.) restrictions include sounds generating from temporary construction and the installation and repair of essential services (e.g.,

power; WAC-173-60-040). Noise generated from substations is exempt from the required nighttime noise level reduction (WAC-173-60-040).

The criterion used to determine the significance of other effects on public health and safety, including EMFs, hazardous materials, fire, and security and public safety was whether the risk would preclude the use of the ROW or nearby areas for pre-existing activities. If the proposed activities did not pose a new health or safety risk but only altered or did not produce changes in activities on or near the ROW, the effect was not considered significant.

3.14.2.2 Noise

Impacts During Construction

Potential noise impacts associated with transmission line alternatives may occur during construction or ongoing operation and maintenance activities. Construction related activities that generate noise include construction of access roads and structural foundations, removal of existing structures, erection of new structures, and tree removal. The loudest noise is anticipated to be associated with site preparation and excavation for structure installation.

No construction activities would occur under the No Action alternative (Alternative 1). All action alternatives would require the construction, reconstruction, or maintenance of access roads (see Chapter 2, Alternatives) and installation of new structures. A new substation would be constructed under Alternatives 2, 3, and 5. In addition, a helicopter would be used to deliver structures under Alternatives 2 and 5, and to deliver conductors. Access roads would be installed using conventional equipment (e.g., grader, bulldozer, truck). BPA (2003b) estimated that overall noise produced by construction equipment was approximately 89 dBA at a distance of 50 feet. Construction noise decreased by 6 dBA for each doubling of distance from the source (Table 3.14-2).

Helicopter delivery would be used primarily to transport structures to locations that do not have access via road and are not located in proximity to private residences. The precise locations where helicopter delivery would be required would be identified as part of final design if the Board of Commissioners decides to move forward with Alternatives 2 or 5. If one of these alternatives were selected, a helicopter flight plan designed to minimize the level of associated disturbance would be developed as part of the detailed engineering plans.

Under Alternative 2, helicopter operations would involve approximately 10 to 15 days of flight time spread over a month. Helicopter operations under Alternative 5 would involve about 4 to 6 days. The helicopter would be used to deliver pre-assembled structures, partially pre-assembled structures, or individual poles, and used to set these structures in holes that would be dug ahead of time. The helicopter would hover at the staging area for up to 5 minutes for each structure and over each structure location for 5 to 10 minutes. The resulting noise impacts would be localized and short term in nature.

Noise impacts associated with construction during this project would be insignificant. Potential impacts would be mainly limited to areas along ROWs with a greater density of residents. Additionally, the duration of construction noise at a given locale would be limited, because the activities would be generally confined to proposed structure sites and would proceed sequentially from site to site.

Table 3.14-2. Construction Noise in the Vicinity of a Construction Site

Distance from Construction Site (feet)	Hourly Median Noise (dBA)
50	89
100	83
200	77
400	71
800	65
1,600	59

The following assumptions were used:
(1) Equipment used were 1 each grader, bulldozer, heavy truck, backhoe, Pneumatic tools, concrete pump, crane.
(2) Reference level noise: 89 dBA (L_{eq}).
(3) Distance for the reference noise level: 50 feet.
(4) Noise attenuation rate: 6 dBA/doubling of distance; this calculation does not include effects of local shielding or atmospheric attenuation.
Source: BPA, 2003b.

Under Alternative 6, the temporary generation units would increase local noise in the Twisp area. Ten of these generators would run 24 hours a day, 7 days a week, and two more would be run during peak demand. Their specification sheet states that they produce 95 dBA at 23 feet from the generation unit with a noise-reducing housing in place. Washington State law and Okanogan zoning ordinances require that the noise be no louder than 50 dBA at the nearest sensitive receptor for residential areas at night. Therefore, the PUD would construct sound walls of sufficient size to reduce the noise to the permitted limit.

Impacts During Operation and Maintenance

Noise impacts during the operation and maintenance of the proposed project would be minimal. All transmission line alternatives, including the No Action alternative, would require routine maintenance. Visual inspections would be made throughout the year as part of overall maintenance activities. It is anticipated that newly installed or replaced structures and conductors would not need replacement or major repairs, barring natural disasters, for about 25 years. The ROW and access roads would be checked at least annually as part of other routine work. In addition to maintenance activities, the construction of new roads for this project may provide additional routes that could be attractive to off-road or four-wheel drive recreational vehicle use. That recreational use of public land is regulated by the land management agency (USDA Forest Service, Bureau of Land Management [BLM], Washington Department of Natural Resources [WDNR], or Washington Department of Fish and Wildlife [WDFW]) and by trespass laws on private property. Post-construction road closures and other measures required by land management agencies and private landowners would restrict such recreational vehicle use and would reduce to less than significant any additional noise from that land use on neighbors.

There is unlikely to be a noticeable change in transmission line noise under Alternatives 4, 6, 7, and the rebuild part of 5 although the existing, older line would be replaced with a newer but larger line. Alternatives 2 and 3 and the new build part of Alternative 5 would add a small amount of new transmission line noise from the new conductor, but the addition would be insignificant at the edge of the ROW. Noise emissions are now and would continue to be negligible at the edge of the ROW (see Section 3.14.1.1).

Audible noise generated from substation equipment is primarily associated with transformers in the substation. Under Alternatives 4, 6, 7, and the No Action alternative, existing substations are expected to continue to operate and produce low levels of noise, because no substation changes are proposed. Noise emissions are now and would continue to be negligible at the property boundary. The new substation, proposed under Alternatives 2, 3, and 5, would negligibly add to noise levels in its

immediate area. The Gold Creek Substation would be located in an agricultural area away from any sensitive receptors. The additional noise levels would be insignificant.

3.14.2.3 Electric and Magnetic Fields

Potential health and safety impacts associated with this project include those that could affect construction workers, operation and maintenance personnel, the public, and others who have may have to enter transmission line corridors. Impact levels depend on public and occupational use of the land, increasing in areas where human activities take place.

Short-Term Effects

Electric fields from high-voltage transmission lines can cause nuisance shocks when a grounded person touches an ungrounded object under the transmission line or when an ungrounded person touches a grounded object (effects and mitigation are discussed in Section 3.14.2.6 below). Electric fields from the proposed 115-kV line would be much lower than those produced by 230-kV or 500-kV lines, for which most studies have been conducted. Magnetic fields from transmission lines can induce currents and voltages on long conducting objects parallel to the lines, which can interfere with electrical devices and also serve as a source for nuisance shocks. However, the effects are well understood and can be mitigated by grounding and other measures (see Section 3.14.2.6 below). For a 115-kV line, the distance where interference could occur under worst-case conditions would be approximately 40 feet from the centerline (BPA, 2003b). Because the ROW edge is 50 feet from the centerline, and no incompatible development would be permitted for safety reasons within the ROW, the impact of this low-risk, low-consequence event is negligible. Under all transmission line alternatives, the short-term effects of EMFs are not expected to preclude normal public or occupational use of the area and therefore would be insignificant.

Long-Term Effects

The issue of whether there are long-term health effects associated with exposure to EMF from transmission lines is controversial. Over the last 20 years, extensive research has been conducted in the United States and around the world to examine whether the exposure to EMF at 50 to 60 Hertz (Hz) has health or environmental effects. Scientific reviews of this research have found insufficient evidence to conclude that EMF exposures lead to long-term health effects, such as adult cancer, adverse effects on reproduction, pregnancy, growth and development of the embryo, or childhood leukemia (NIEHS, 2002).

Under Alternatives 4, 6, 7, and the No Action alternative, EMF levels would remain relatively constant because no additional lines would be added. Alternatives 2, 3, and 5 would be expected to produce an increase in EMF levels because they each propose to establish a new transmission line where no transmission lines exist. This increase in EMF levels is expected to be negligible.

3.14.2.4 Hazardous Chemicals

Hazardous substances present in the project area include those associated with transmission line construction and operation, including structure preservatives and ROW vegetation management. The PUD will develop a Spill Prevention, Control, and Containment (SPCC) Plan that will include information on all state or Federally listed substances used during operation of the transmission line. Materials, location, duration of storage, and application purpose will be identified.

Utility Structures

Under all action alternatives and maintenance procedures, pentachlorophenol-treated wood structures would likely be used. Wood preservatives function by exhibiting an acute toxicity to fungi and insects that can destroy wood. All wood preservatives have the ability to create a toxic response if released to the environment in large quantities. The greatest concern with wood preservative chemicals is the possibility of accidental contamination through spills and leaching of chemicals from treated wood

products. However, the potential for spills associated with this project has been eliminated because structures would be delivered to the site pre-treated.

Pentachlorophenol penetrates deeply into pressure-treated wood, but may leach in small amounts depending on soil characteristics (e.g., temperature and moisture). However, studies have shown that the release of chemicals from utility structures is small and usually limited to the area surrounding the structure. The release of small quantities of the organic preservative, such as are anticipated from utility structures, would be destroyed through natural degradation mechanisms (ATSDR, 2001).

Under Section 313 of the Emergency Planning and Community Right to Know Act, releases of more than 1 pound of pentachlorophenol into the air, water, and land must be reported annually and entered into the Toxic Release Inventory (TRI). EPA has set a limit for drinking water of 1 part of pentachlorophenol per billion parts of water (1 ppb). The Occupational Safety and Health Administration (OSHA) has set a limit of 0.5 milligrams of pentachlorophenol per cubic meter of workplace air (0.5 mg/m^3) for 8-hour shifts and 40-hour work weeks. None of the proposed alternatives would exceed these limits.

Herbicides

The PUD presently conducts weed control along transmission and distribution line ROWs where weed spread is a problem. The PUD will rely on a licensed contractor to perform weed control and the Okanogan County Noxious Weed Control Board for expertise and advice. Within the ROW, weeds are also removed using mechanical and manual procedures. Use of herbicides is limited and primarily occurs annually near substation facilities. No herbicides would be used on National Forest System (NFS) or BLM lands, except under the existing permit for the Loup Loup Substation. Possible health and safety impacts associated with the application of herbicides include their toxicity and the long-term effects of exposure on workers who apply them, as well as effects on non-target native plants, wildlife, aquatic resource, and people. To minimize these risks, all herbicides considered for the suppression of noxious weeds currently do and would continue to comply with state and Federal regulations under all alternatives. In addition, treatments would be spot-applied to weed populations rather than broadcast or aerially applied.

No significant impacts associated with hazardous substances are expected to occur.

3.14.2.5 Fire

Construction or replacement of the transmission line with any of the action alternatives would occur during the spring, summer, and fall months. During this time, the weather could be hot and dry, with increasing danger of fire. Potential sources of fire associated with the construction and operation of the proposed transmission line alternatives include the use of vehicles and other motorized equipment (OHVs), transmission line failure, reconstruction of the Loup Loup transmission line with electricity flowing, and vegetation in the ROW. These impacts would be primarily related to vegetation conditions within and adjacent to transmission line ROWs. Conditions that are conducive to wildfire include seasonally dry vegetation, the presence of large dead or dying trees, and overgrown vegetation along the ROW.

Fires on or near the ROW can jeopardize safe and reliable operation of transmission lines. Threats include physical damage from heat and flames, as well as arcing between lines, between lines and a transmission structure, or between lines and the ground caused by smoke and hot gases. Under Alternatives 4 through 7, the Loup Loup transmission line would continue to be the only source of electricity for Twisp and Winthrop and the lower Methow Valley above Gold Creek, and residents and businesses could be significantly impacted in the event of a large-scale forest fire that destroyed a part of the line.

The PUD would require all contractors to carry fire suppression tools (shovel, axe, and fire extinguisher) to minimize the potential impact of starting a wildfire with transmission line construction activities under all alternatives. The PUD would coordinate with the affected land management agencies to restrict construction activities to periods of minimal fire hazard, and would obey National Forest and other land closures to construction activities during extreme fire danger periods.

If fires due to transmission line failure during normal operation occur in remote areas, there is concern that it may be difficult to respond to them. However, cleared ROWs in forested areas serve as firebreaks and improve access for firefighters, and the access roads that currently exist provide access to most of the ROW. Under Alternative 2, there could be areas without access roads, but they are few and can be reached by four-wheel drive vehicles in an emergency. To minimize the risk of fire in less accessible forested areas, the PUD will establish and maintain safe clearances between the tops of trees and the proposed transmission line. Trees within or adjacent to the ROW that could cause electricity to arc from the transmission line or pose a hazard if they fall and come in contact with the line will be felled or topped to create snags.

The construction of new roads for this project may provide additional routes that could be attractive to off-road or four-wheel drive recreational vehicle use, which in turn could be a source of additional ignition for wildfires. Recreational use of public land is regulated by the land management agency (USDA Forest Service, BLM, WDNR, or WDFW) and by trespass laws on private property. Post-construction road closures and other measures required by land management agencies and private landowners would restrict such recreational vehicle use and would reduce to less than significant potential for additional ignition sources from that land use. As discussed in the Recreation section, additional recreational vehicle use is not expected to result from this proposed project. Therefore, no additional fires are expected to be started by recreational vehicles.

Transmission line structures may be struck by lightning. While this may result in a temporary power outage, there is a minimal risk of starting a fire because the structures are electrically grounded and the current from the lightning strike passes directly into the ground. This minimal risk is present in the existing system and would persist under all alternatives. Alternative 2 would add somewhat to this risk because the Pateros/Twisp transmission line crosses unforested land for the most part and may be the highest structure in the area. However, the risk of lightning strike is small.

By following the mitigation measures described above, the PUD would effectively minimize the risk of fire associated with construction and operation activities for all of the alternatives. Impacts of any of Alternatives 2 through 7 associated with fire would not be significant.

3.14.2.6 Security and Public Safety

Power lines, like electrical wiring, can cause serious electric shocks if certain precautions are not taken. These precautions include building the lines to minimize shock hazard. The National Electrical Safety Code (NESC) specifies the minimum allowable distance between the lines and the ground and other objects. These requirements determine the edge of the ROW and the height of the line.

Risk to construction personnel would be low under Alternatives 2, 3, 6, and the No Action alternative because there would be no electricity flowing in the transmission line during the rebuilding or construction process. The risk would be greater under Alternatives 4, 5, and 7, which propose rebuilding portions of the existing Loup Loup transmission line while it is energized. To reduce this risk, fences and other metal structures on and near the ROW would be grounded during construction to limit the potential for nuisance shocks. Following NESC construction standards would minimize risk to the public. Under all alternatives, public and occupational use (i.e., construction and maintenance) would continue as before. Accordingly, the short-term effects under all alternatives would not be significant.

Public safety is at risk when there are unplanned power outages. Under all alternatives that do not fully resolve the radial feed problem (Alternatives 1 and 4 through 7; see discussion of reliability in Section 2), the unplanned power outages will continue. As was demonstrated in the recent outage (September 2004), children at public schools are at risk because the schools cannot provide minimum services, businesses such as restaurants and gas stations must close and cannot serve their customers, and emergency services such as fire and medical services are without power. In addition, people whose houses depend entirely on electrical heat may be at risk during the winter if outages extend more than a few hours. While unplanned outages are by their nature unpredictable, the history of the Loup Loup transmission line indicates that they occur at least annually and are likely to continue into the future. Alternatives 2 and 3 provide a complete solution to the transmission reliability problem, thus substantially reducing this public safety hazard, and Alternative 5 provides a partial solution that does not address transmission outages in the Twisp and OCEC service areas.

3.14.2.7 Cumulative Effects

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting noise, EMF, hazardous materials, and fire are included in the affected environment portion of this section. In the case of Alternatives 2 and 3, other past, present, and reasonably foreseeable actions include the operation and maintenance of the existing Loup Loup transmission line and the valley floor distribution circuits. As a result, all of the cumulative effects sections assess the effects of Alternative 2 and 3 in conjunction with the existing Loup Loup transmission line and the valley floor distribution circuits. Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area.

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These activities include grazing allotment actions and fuels management and timber salvage activities on NFS lands; Forest Practice Applications and grazing permits and leases approved by the WDNR on both state and private lands; residential and commercial development projects either recently approved or pending approval from the Okanogan Planning Department; and transportation improvement projects.

Of these reasonably foreseeable actions, fuels management and timber salvage projects on NFS lands; Forest Practices on local government, state, and private forestlands; and residential and commercial development have the potential to contribute to cumulative impacts on noise, EMF, hazardous materials, and/or fire. The four reasonably foreseeable fuels management and timber salvage projects on NFS lands would meet all applicable Forest Plan standards and guidelines and are not expected to have significant effects on any public health and safety. The 16 reasonably foreseeable Forest Practices authorized by WDNR within or in the immediate vicinity of the project area would meet all Forest Practices rules, which are also, among other things, designed to specifically address cumulative effects (WAC 222-12-046). None of these projects involves the use of herbicides or other chemicals. In addition, these types of projects do not emit EMF. The reasonably foreseeable development projects within the project area located between Pateros and Twisp are discussed in Section 3.1 and include residential and commercial development projects either recently approved or pending approval from the Okanogan Planning Department. Alternatives 2, 3, and part of Alternative 5 are adjacent to planned developments (Tacoma Land Company [approved], Caribou LLC [pending]) located along Bill Shaw Road with access off Burma Road. Several residential short plats that have been approved or are pending approval are located along the valley floor (see Section 3.1). The reasonably foreseeable residential development projects in the area approved and pending approval by the Okanogan County Planning Department are assumed to meet all local, county, and state planning regulations and ordinances, including those designed to minimize noise impacts.

Noise

For Alternatives 2 through 7, construction noise from the proposed project would temporarily add to noise from other activities in the area, such as traffic on Highways 20 and 153. Some additional, localized noise would also occur around the proposed Gold Creek Substation, but in agricultural lands away from sensitive receptors. Under Alternatives 2 and 5, helicopters would be used to transport structures to portions of these routes, and an increase in noise would occur. Noise from helicopters would be localized, temporary in nature, and away from sensitive receptors.

Pending work orders for development along Bill Shaw Road, Burma Road, Twisp Business Park, and within the incorporated area of Twisp indicate increased development within the project area. Increased traffic noise levels around these areas may result.

The Hungry Hunter, Loup Loup Blowdown Salvage, and Lower Methow fuels management and salvage projects could temporarily overlap with the proposed project in space and time and could contribute to cumulative effects on noise. The Loup Loup Blowdown project, adjacent to the existing Loup Loup line (Alternatives 4 through 7), was authorized in 2004 and is expected to be sold in March or April 2005. The Hungry Hunter project, located adjacent to the project area boundary west of the Valley Floor line (Alternative 3), was authorized in June 2004, and the first contract under the project was awarded in January 2005. Other contracts under this project are yet to be advertised. Both of these projects could contribute to increased noise levels associated with the proposed construction activities if their implementation coincides with this project. No details have yet been developed regarding the Lower Methow Timber Sale. Noise impacts from the proposed project are expected to be temporary and similar to existing conditions; therefore, significant cumulative effects due to noise associated with this project are not expected.

The use of diesel generators under Alternative 6 would temporarily add to cumulative impacts to noise levels near Twisp. However, as mentioned in 3.14.2.2, the PUD will construct sound walls surrounding generators to reduce noise levels to the permitted limit.

EMF

Distribution lines currently run along the proposed Valley Floor route and along the existing Loup Loup transmission line route. These lines do and will continue to emit EMF. The proposed new transmission lines under Alternatives 2, 3, and the new build part of Alternative 5 would add to existing EMF. However, recent studies on the PUD's existing Brewster 115-kV line, which has a comparable load and configuration to the proposed transmission line, determined that EMFs were indistinguishable from background levels at a distance of 25 feet from the line (Duke Engineering, 1999). Consequently, the cumulative effects of the additional EMF are not expected to be significant. No other future new transmission lines are planned for the Methow Valley.

Hazardous Materials

Use of power structure preservative could result in cumulative effects to the environment if chemicals leach into the soil in areas where leaching has occurred in the past (i.e., from structures that are now being replaced). The PUD will follow strict Federal and state guidelines concerning use and application of hazardous chemicals to reduce this risk to less than significant. Herbicide application may occur once a year in locations where its use is permitted and would be site specific, avoiding non-target organisms. Therefore, no significant cumulative effects are expected from the use of herbicides to control noxious weeds.

Fire

Transmission line failure, resulting in fire, could contribute to the cumulative impacts of wildfires. Because these sources are unlikely and controllable through efforts of the construction crew and post-construction mitigation, cumulative impacts are not expected to be significant. The PUD is currently working with the Forest Service, the WDNR, and a group of local citizens to address fire concerns

associated with the existing Loup Loup transmission line. This ongoing effort—the Loup Power Line Shaded Fuel Break project—will improve the potential for firefighters to stop a fire from reaching the transmission line, but it will not eliminate the risk of this happening.