3.18 Public Health and Safety

This section includes information regarding public health and safety and hazardous materials that pertains to the area of the proposed Project. Electric transmission projects may affect public health and safety during construction and operation. Potential health and safety concerns related to power transmission during construction include worker injuries, exposure to hazardous materials, contaminated sites, or excessive noise, and other risks to workers and the surrounding community from accidents that could occur within the proposed analysis area. Health and safety concerns associated with operations include electrical shock, electric and magnetic fields, corona, stray and induced voltage, collision hazards, fire risk, and public access to transmission structures and substation equipment. Worker safety issues are associated with Project construction, operation, and maintenance activities.

Transportation-related safety issues include highway and roadway safety associated with the transport of structures, structure hardware, conductors, and employees, as well as hazards associated with proximity to airports or military operation areas and are addressed in Section 3.16, Transportation.

As with any U.S. energy infrastructure, the proposed transmission line could be the target of terrorist attacks or sabotage. Potential impacts from a sabotage or terrorism event are evaluated by analyzing the outcome of catastrophic events such as major and minor transmission line failures or accidents without determining the motivation behind the incident. Thus, such outcomes could be representative of the impacts from a sabotage or terrorism event. The level of risk is estimated based on the current conceptual design of the transmission line, applicable health, safety, and spill prevention regulations, and expected operating procedures.

3.18.1 Regulatory Background

The Project crosses many jurisdictions including federal lands managed by the USFS, BLM, NPS, DOE, DOD, and Bureau of Reclamation, state land, and county and city lands. Depending on the specific location, a number of public health and safety regulations may be applicable to various portions of the Project. OSHA has jurisdiction over most occupational health and safety issues within each state the Project crosses. Industrial construction and routine workplace operations are governed by the OSHA of 1970, particularly including 29 CFR 1910 (general industry standards) and 29 CFR 1926 (construction industry standards). While there are no federal noise regulations, municipalities and local governments may adopt laws and regulations that impose a maximum noise limit within a community. These ordinances are often enforced by police or an agency.

"Hazardous materials," which are defined in various ways under a number of regulatory programs, can represent potential threats to both human health and the environment when not properly managed. The term hazardous materials include the following materials that may be utilized or disposed of in construction and operation:

- Substances covered under Occupational Health and Safety Administration Hazard Communication Standards (29 CFR 1910.1200 and 30 CFR 42).
- “Hazardous materials" as defined under US DOT regulations at 49 CFR, Parts 170-177: The types of materials that may be used in construction and operational activities and that would be subject to these regulations would include sodium cyanide, explosives, cement, fuels, some paints and coatings, and other chemical products.
- “Hazardous substances” as defined by Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and listed in 40 CFR Table 302.4: The types of materials that may contain hazardous substances that would be subject to these requirements would include solvent-containing materials (e.g., paints, coatings, and degreasers), acids, and other chemical products.

- "Hazardous wastes" as defined in the Resource Conservation and Recovery Act (RCRA): Procedures in 40 CFR 262 are used to determine whether a waste is a hazardous waste. Hazardous wastes are regulated under Subtitle C of RCRA.
- Any "hazardous substances" and "extremely hazardous substances" as well as petroleum products such as gasoline, diesel, or propane, that are subject to reporting requirements if volumes on-hand exceed threshold planning quantities under Sections 311 and 312 of SARA. The types of materials that may be used in construction and operational activities and that could be subject to these requirements would include fuels, coolants, acids, and solvent-containing products such as paints and coatings.
- Petroleum products defined as "oil" in the Oil Pollution Act of 1990: The types of materials that would be subject to these requirements include fuels, lubricants, hydraulic oil, and transmission fluids.

In conjunction with the definitions noted above, the following lists provide information regarding management requirements during transportation, storage, and use of particular hazardous chemicals, substances, or materials:

- The Superfund Amendments and Reauthorization Act Title III List of Lists or the Consolidated List of Chemicals Subject to Emergency Planning and Community Right-to-Know Act and Section 112(r) of the Clean Air Act.
- The USDOT listing of hazardous materials in 49 CFR 172.101.

Certain types of materials, while they may contain potentially hazardous constituents, are specifically exempt from regulation as hazardous wastes. Other wastes that might otherwise be classified as hazardous are managed as "universal wastes" and are exempted from hazardous waste regulations as long as those materials are handled in ways specifically defined by regulation.

3.18.2 Analysis Area

For the purposes of public health and safety, the project analysis area is defined as a 2-mile transmission line corridor area for each of the alternative routes.

3.18.3 Occupational Safety

Worker safety in construction and industrial settings is regulated by OSHA. The proposed Project would be subject to OSHA standards during construction and operations (e.g., OSHA General Industry Standards [29 CFR 1910] and the OSHA Construction Industry Standards [29 CFR 1926]). OSHA standards are designed to protect workers from potential construction and industrial accidents, as well as to minimize exposure to workplace hazards (e.g., noise, chemicals). **Table 3.18-1** summarizes 2010 national safety statistics from the Bureau of Labor Statistics (BLS) for industry categories that are relevant to the proposed project.

Table 3.18-1 2010 National Statistics for Workplace Hazards

Industry	Nonfatal Recordable Incidents (Per 100 Full-Time Equivalent Workers)	Lost Workdays (Per 100 Full-Time Equivalent Workers)	Fatalities (Per 100,000 Full-Time Equivalent Workers)*
Construction	4.0	2.1	9.0
Utilities (electric power generation, transmission, control, and distribution)	3.1	1.7	2.5

Sources: BLS 2010a,b,c.

From 2003 to 2007, the most common causes of fatalities were transportation accidents (36 percent), followed by assaults and violent acts (15 percent) and falls (14 percent). Worker contact with electric current in some shape or form was responsible for 4 percent of fatal workplace accidents. Worker contact with overhead power lines was the cause of on-the-job electrical deaths in 45 percent of all occupational electrical fatalities (ESFI 2010).

The 2010 injury rate for the state of Utah was not statistically different from the national rate. Wyoming and Nevada had injury rates statistically greater than the rest of the country. State injury rates were not available for Colorado (BLS 2010a). Worker safety issues are a concern during all phases of the Project.

3.18.4 Electric and Magnetic Fields, Corona, and Stray Voltage

Electric and magnetic fields (EMF) are produced by voltage, i.e., the electrical pressure that drives an electric current through a circuit. Magnetic fields are produced by current, which is defined as the movement or flow of electricity. The earth has both magnetic fields produced by currents of highly conductive iron contained within the molten core of the planet and an electric field produced by the electric potential differences between the land's surface (negatively charged) and the atmosphere (positively charged). Electric fields occur naturally, radiating from the earth's core to the atmosphere. These electrical fields dissipate with elevation. For example, there is approximately a 200 volts difference between the electric field at your head compared to your feet (Carlson 1999). While electrical fields can be easily shielded or reduced by walls and other objects, magnetic fields are not and they are more likely to penetrate into the body.

EMFs are present wherever electricity is used, such as in household appliances, cell phones, wristwatches, lamps, computers, and transmission lines. The electric-field strength from wiring and appliances located within homes is typically less than 0.01-kV/m, while greater field strength can be found very close to some appliances, such as electric blankets. Typical homes produce background magnetic field levels (away from appliances and wiring) that range from 0.5 milliGaus (mG) to 4 mG, with an average value of 0.9 mG.

High voltage direct current (DC) and alternating current (AC) power lines produce different types of EMF. An AC power line alternates at a rate of 50 to 60 times a second (Hz), while a DC power line produces a static electric field that does not alternate. Static electric fields, such as those produced from DC power lines, are encountered naturally in the everyday environment such as when walking across carpet on a dry day (Bailey 2006). Static electric fields can be blocked by trees, bushes, and any conducting building material. There are no federal standards or standards from affected states limiting occupational or residential exposure to power line EMF; however, the International Committee on Non-ionizing Radiation Protection (ICNIRP) has set a voluntary protection level for electrical fields for the general public of 4.2-kV/m (ICNIRP 1998). The results of the few electric static studies that have been conducted indicate that the only effects are associated with body hair movement and discomfort from spark discharges (WHO 2006). The recommended maximum static magnetic field exposure value from the World Health Organization (WHO) is 200,000 mG during the working day for occupational exposure (WHO 2006). The natural magnetic field varies from 350 to 700 mG. Man-made devices that use DC, such as electric trains and some industrial use equipment, can be up to 1,000 times as strong as what is produced naturally. Medical devices such as MRIs can produce magnetic fields up to 100,000 times stronger than the naturally occurring magnetic field (TWE 2011). Both electric and magnetic fields diminish rapidly between 50 to 100 feet from the source and are insignificant at distances more than 100 feet (TWE 2011).

It has been suggested that a connection may exist between EMFs and various forms of cancer (WHO 2011). However, there have been mixed and often conflicting opinions regarding health effects related to EMF exposure. Human exposure to a 60-Hz magnetic field from alternating current produces a current density that is approximately 1,000 times less than naturally occurring currents (National Research Council [NRC] 1997). Additionally, human exposure to the magnetic field from high capacity

direct current power lines is the same or less than to the naturally occurring magnetic field (TWE 2011). While some studies have linked EMF to increased incidence of childhood leukemia, central nervous disorders, and adult cancers (including leukemia), the results have not been reproducible or conclusive (National Institute of Health [NIH] 1999, NIH 2005). The National Research Council evaluated the published literature on EMF and found a statistical relationship between residential wiring codes and an increased incidence of childhood leukemia, but there was no correlation between measured magnetic fields and incident rates of childhood leukemia (NRC 1997). Further, there is no known mechanism for EMF to cause disease (NRC 1997). Other studies have failed to indicate a correlation between exposure levels or exposure duration. There is no consistent or conclusive evidence linking exposure to EMF from electrical transmission lines to human disease (NRC 1997, NIH 2005).

Corona, a luminous electrical discharge on a transmission line, is caused by electric current arcing across two or more points along transmission line conductors. It can be seen as bluish tufts or streamers surrounding the conductor, and generally a hissing sound can be heard. Transmission line corona varies with atmospheric conditions, being more intense during wet weather. Corona on the surface of high voltage conductors can create signals that may interfere with radio and television reception, but can be minimized with modern transmission line design.

It has been hypothesized that corona creates ions that can be dispersed by winds, inhaled and deposited on the skin and in the lung, and lead to adverse human effects (Fews et al. 1999). The Independent Advisory Group on Non-ionizing Radiation (National Radiological Protection Board 2004) concluded that:

> *"…it seems unlikely that corona ions would have more than a small effect on the long-term health risks associated with particulate air pollutants, even in the individuals who are most affected. In public health terms, the proportionate impact will be even lower because only a small fraction of the general population live or work close to sources of corona ions."*

Subsequent reviews have reaffirmed the lack of correlation between exposure to EMF or corona ions and adverse health effects (WHO 2007; Energy Network Association 2009).

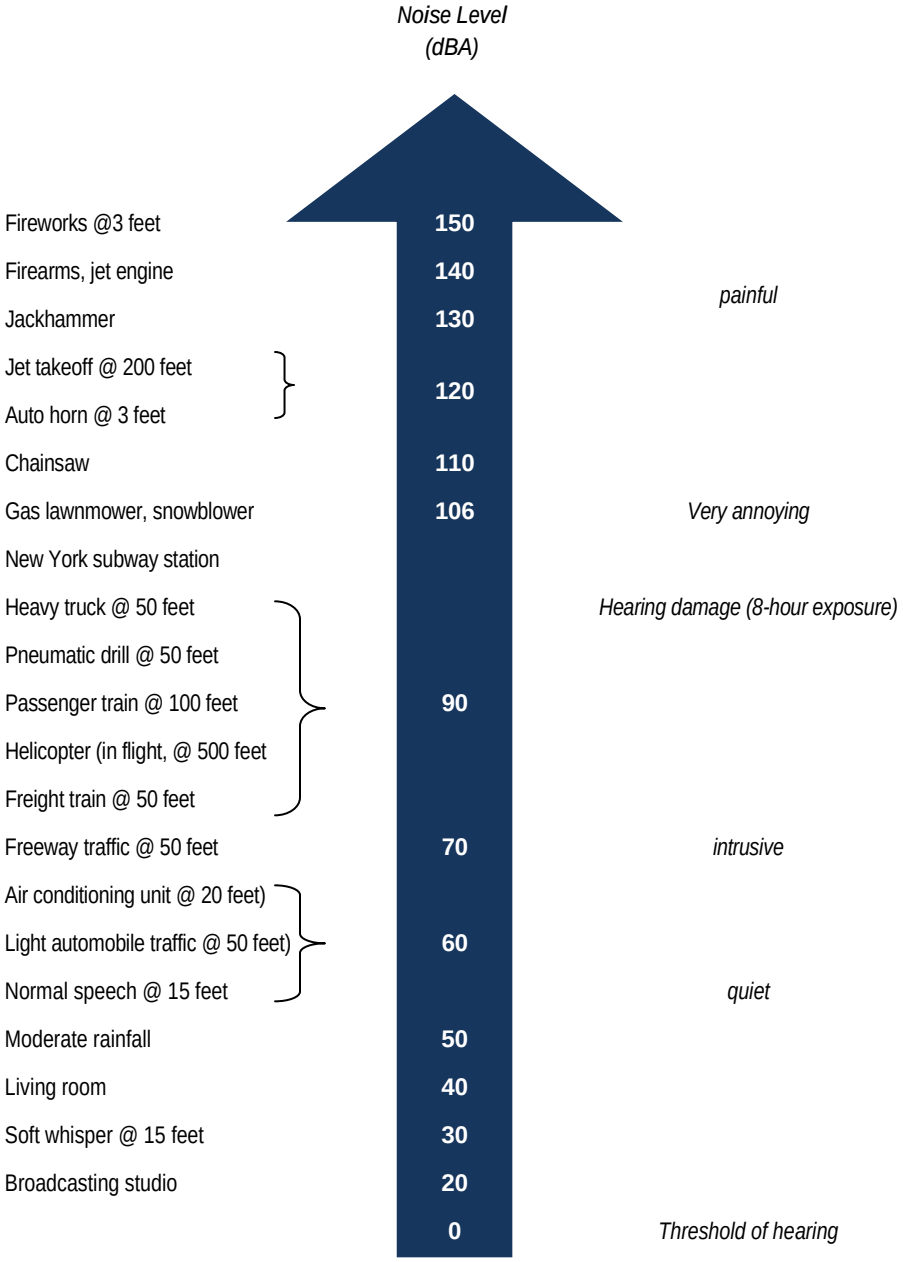
Stray voltage is typically associated with rural end-users, such as farm and ranch complexes where equipment is exposed to dust and other contaminants. Induced current occurs along linear features, such as fences that parallel conductors, and typically can be minimized with adequate grounding. As a result of their static nature, DC lines do not induce currents and voltages. In contrast, as a result of their alternating nature, AC electric fields can induce currents and voltages in nearby conductive objects.

3.18.5 Noise

Noise is defined as any sound that is undesired or interferes with one's hearing. Noise is considered a human health concern as it can interferes with speech communication and hearing or is otherwise considered annoying. The term "unwanted" can be subjective in nature and can vary greatly among individuals. An individual's response to noise is influenced by the type of noise, perceived importance of the noise, appropriateness in the setting, time of day, type of activity during which the noise occurs, and the sensitivity of the individual.

Sound is measured in dBA and is based on a logarithmic scale to account for the wide range of audible sound intensities. Under the logarithmic scale for sound (and noise), a 10-dBA increase would increase sound intensity by 10 times; a 20-dBA increase would increase sound intensity by 100 times. As a result, methods have been developed for weighting the sound frequency spectrum to approximate the response of the human ear. The dBA scale uses a sound range of 0 to 140 dBA and is the most widely used weighted scale for environmental noise assessments because of its relative convenience and

accuracy in correlating with people's judgments of what constitutes noise. Typical A-weighted sound and noise levels associated with common activities or situations are shown in **Figure 3.18-1**.



Source: CEQ 1970.

Figure 3.18-1 Typical A-weighted Sound Levels

Ambient noise, or background noise, is defined as an assortment of noise from nearby and distant sources, relatively steady and homogeneous, with no particular source identifiable within it (National Wind Coordinating Committee 2002). Ambient noise levels within the Project corridor have not been measured; however, as rural background noise in wilderness and rural areas typically is 40 dBA (USEPA 1978), they are likely to be similar in magnitude. Levels near developed areas and along area roads and highways are likely to be higher due to vehicle movement and other human activities. Wind is frequently a major contributor to ambient noise levels within the area, as well as agricultural machinery

noise when operated near residences and other sensitive receptors. Sensitive receptors within the area are limited to residents in scattered rural locations as well as low population urban areas.

Noise level from a line source such as a power line will decrease by 6 dBA for every doubling of the distance away from the source (Truax 1999). This concept, known as geometric spreading, is based on the inverse square law. This law states that the intensity of the influence at any given radius is the source strength divided by the area of the sphere. The energy twice as far from the source is spread over four times the area, hence the sharp drop off in intensity. Sound intensity follows the inverse square law assuming there are no reflections or reverberations. **Table 3.18-2** displays the human perception of a change in decibel levels.

Table 3.18-2 Human Perception of Noise Level Changes

Change in Decibel Level	Result
1 dBA	Cannot be perceived
3 dBA	Barely discernible
5 dBA	Noticeable community response
10 dBA	Causes an adverse community response

As shown above, when comparing similar sounds (e.g., changes in traffic noise levels) a 3-dBA change in sound-pressure level is considered detectable by the human ear in most situations. A 5-dBA change is readily noticeable by most people, and a 10-dBA change is perceived to be a doubling (or halving) of sound or noise. Impacts to wildlife from noise are addressed in Section 3.7, Wildlife and Section 3.8, Special Status Wildlife Species.

3.18.6 Hazardous Materials and Waste

3.18.6.1 Hazardous Materials

A number of hazardous substances are used in the construction, operation, and maintenance of electrical transmission lines. **Table 3.18-3** lists common types of materials that could be used, but is not a comprehensive list. Generation of hazardous waste is not anticipated.

Table 3.18-3 Hazardous Materials Typically Used for Transmission Line Construction

2-cycle oil (contains distillates and hydrotreated heavy paraffinic)	Gasoline treatment
ABC fire extinguisher	Hot stick cleaner (cloth treated with polydimethylsiloxane)
Acetylene gas	Hydraulic fluid
Air tool oil	Insulating oil (inhibited, non-PCB)
Ammonium hydroxide	Lubricating grease
Antifreeze (ethylene glycol)	Mastic coating
Automatic transmission fluid	Methyl alcohol
Battery acid (in vehicles and in the meter house of the substations)	Motor oils
Bottled oxygen	Paint thinner
Brake fluid	Pesticide
Canned spray paint	Propane

Table 3.18-3 Hazardous Materials Typically Used for Transmission Line Construction

Chain lubricant (contains methylene chloride)	Puncture seal tire inflator
Connector grease (penotox)	Safety fuses
Contact Cleaner 2000	Starter fluid
Diesel deicer	Sulfur hexaflouride (within the circuit breakers in the substations)
Diesel fuel	1,1,1 trichloroethene
Diesel fuel additive	WD-40 (penetrating oil)
Gasoline	

Source: San Diego Gas and Electric (SDGE) 2006.

3.18.6.2 Solid Waste

Solid waste generated from transmission line construction is minimal when compared to other types of industrial and commercial construction projects. Solid waste generated from construction and operation of the proposed transmission line and substations would generally consist of construction rubble (e.g., excess or off-spec concrete, soil, and rock), paper, cardboard, and packing material, brush, other vegetation, and scrap metal (SDGE 2006).

3.18.6.3 Existing Contaminated Sites

Exposure to certain chemicals can adversely affect human health through toxic reactions, carcinogenic effects, or both. Chemical exposure can occur from chemicals present in water or in soil from past industrial activities. Contaminated sites can result from industrial activities (mineral extraction, mineral processing, and manufacturing) or from commercial activities (fuel storage for retail outlets, vehicle maintenance). Active or closed landfills or unauthorized dumps also may present potential for exposure.

There are no known contaminated sites along the proposed route; however, despite the predominantly rural landscapes crossed by the proposed Project, contaminated sites may be encountered or discovered during construction, given that the proposed routes often parallel- or are within- existing utility and transportation corridors or are in areas with current or historic oil and gas production. No Phase I Environmental Site Assessments have been conducted for the proposed route.

3.18.7 Impacts to Public Health and Safety, Hazardous Materials

The impact analysis area for public health and safety is defined as the area within the 2-mile transmission line corridor of any of the alternative routes. Potential impacts associated with public health and safety, such as construction injuries to project personnel, electric and magnetic fields (EMF), corona effects, stray and induced voltage, noise, and hazardous materials are evaluated for the impact analysis area.

The methodology for evaluating impacts on public health and safety involves identifying and assessing design, construction, and operational standards and guidelines for electric transmission lines; determining the proximity of populated areas and structures to the proposed project; and calculating the proximity of communication sites and co-located pipelines to the analysis area. Communication sites were analyzed in order to assess the probability of communication disturbances caused by corona. The potential effects of EMF from AC power lines on co-located pipelines are discussed in Section 3.18.7.2.

The following impact parameters have been used for this analysis:

- Number of communities, sensitive receptors, and recreation areas within the 2-mile transmission line corridor area.
- Number of residences, commercial/industrial buildings, agricultural buildings, and outbuildings within 500 feet and 200 feet of the reference line.
- Number of non-project related communication sites within the 2-mile transmission line corridor analysis area. Communication sites may include, but are not limited to, AM, FM, cellular, television, and microwave sites.
- Potential for accidental release of hazardous materials during construction and operation.

Impact parameters were used in combination with effects information for the purpose of quantifying impacts. The impact parameters also allow comparisons among alternatives or alternative variations. Impact issues and the analysis considerations for public health and safety are listed in **Table 3.18-4**.

Table 3.18-4 Relevant Analysis Considerations for Public Health and Safety, Hazardous Materials

Resource Topic	Analysis Considerations and Relevant Assumptions
Serious injuries to workers and the public at-large.	The analysis evaluates potential construction and operation impacts to the health and safety of workers.
Adverse health impacts from EMF, stray voltage, and induced voltage associated with transmission lines.	The analysis evaluates direct effects on communities and sensitive receptors from potential adverse impacts from electric transmission.
Noise impacts to nearby communities and residences.	The analysis evaluates the potential for noise impacts on nearby communities, residences, and other noise sensitive receptors.
Impacts from accidental release of hazardous materials.	The analysis evaluates potential impacts from the accidental release of hazardous materials.

3.18.7.1 Impacts from Terminal Construction and Operation

The northern and southern terminals would be constructed regardless of alternative route or design option.

Northern Terminal

The Northern Terminal would be sited on private lands near Sinclair, Wyoming and would require an initial disturbance of 504 acres for construction and a permanent disturbance of 234 acres for operation.

There are no residences, communities, parks or developed recreation areas within 1 mile of the proposed terminal site. There is a federal prison located more than 2 miles from the terminal site. There are no other sensitive receptors located within 1 mile of the terminal site. There are no structures within 500 feet of the terminal site. The lack of sensitive receptors and structures near the terminal site would result in no impacts from noise and EMF. The lack of communication sites near the terminal area also would result in no impacts to emergency communications. Further analysis is provided in the subsections below.

Occupational Safety

During construction of the Northern terminal, workers would be at risk of injury from use of heavy equipment, working at heights, working in the vicinity of high voltage equipment, as well as from typical

hazards found on a construction site. Based on BLS data from 2010, there are four construction-related non-fatal recordable incidents per 100 full-time equivalent workers. Based on an average construction workforce of approximately 400 workers, it is estimated there would be 16 non-fatal recordable incidents. In order to minimize hazards to construction workers that may result in injuries that meet or exceed the BLS threshold, workers would follow the National Electrical Safety Code (NESC), U.S. Department of Labor requirements, and Occupational Safety Health Administration (OSHA) safety standards, as well as project-specific safety requirements (TWE-51). A health and safety plan also would be implemented to protect workers and the public during construction (TWE-56).

Through the implementation of TWE-51 and TWE-56, as well as adherence to the NESC, U.S. Department of Labor requirements, and OSHA safety standards, minimal to no impacts to worker safety are anticipated from terminal construction.

During operations, there would be risk for injuries to maintenance and contract workers. To minimize risk, safety measures would be taken that include following the NESC, U.S. Department of Labor requirements, and OSHA safety standards, as well as providing appropriate training to all pertinent personnel. To reduce the risk of fire, fire protection staff would be located at the terminal. Safety and security lighting, as well as security fencing, would be installed as well. Security staff would consist of support operations and maintenance workers located at the terminal.

Through adherence to the NESC, U.S. Department of Labor requirements, and OSHA safety standards, as well as the installation of security lighting and fencing, minimal to no impacts to worker safety are anticipated from terminal operations.

Fire Risk

To minimize the incidence of injuries due to fire during construction and operation, a Fire Protection Plan would be implemented (TWE-64). Components of this plan include, but are not limited to, work vehicles would carry shovels, water, and fire extinguishers, operating all vehicles on designated roads, parking in areas free of vegetation, and operating welding, grinding, or cutting activities in areas cleared of vegetation.

Through the implementation of TWE-64, impacts to public health and safety as a result of fire are not expected.

Noise

Other health effects to construction workers and the public in the vicinity of the terminal area would include increased noise levels from heavy construction machinery and construction activities, as well as light vehicle construction traffic. Average noise levels for typical construction equipment range from 74 dBA for a roller to 88 dBA for a crane (Harris, Miller, Miller, and Hanson, Inc. [HMMH) 2006). In general, the dominant noise source from most construction equipment is the diesel engine, particularly if the engine is poorly muffled. Other sources of continuous noise include field compressors, bulldozers, and backhoes. **Table 3.18-5** portrays the noise levels of various types of construction equipment expected at different distances.

Table 3.18-5 Noise Levels at Various Distances from Typical Construction Equipment

	Noise Level[1] at Distances (dBA)					
Construction Equipment	**50 feet**	**100 feet**	**200 feet**	**400 feet**	**800 feet**	**1,600 feet**
Bulldozer	85	79	73	67	61	55
Concrete Mixer	85	79	73	67	61	55
Concrete Pump	82	76	70	64	58	52

Table 3.18-5 Noise Levels at Various Distances from Typical Construction Equipment

	Noise Level[1] at Distances (dBA)					
Construction Equipment	**50 feet**	**100 feet**	**200 feet**	**400 feet**	**800 feet**	**1,600 feet**
Crane, Derrick	88	82	76	70	64	58
Crane, Mobile	83	77	71	65	59	53
Front-end Loader	85	79	73	67	61	55
Generator	81	75	69	63	57	51
Grader	85	79	73	67	61	55
Shovel	82	76	70	64	58	52
Truck	88	82	76	70	64	58

[1] The equivalent steady-state sound level that contains the same varying sound level during a 1-hour period.

Source: HMMH 2006.

For a general assessment of construction impacts, assuming a geometric spreading only (i.e., a decrease of about 6 dBA per doubling of distance from a point source) on the basis of the noise levels presented in **Table 3.18-5**, it is estimated that the noisiest piece of equipment operating at peak load would produce noise levels that would exceed the USEPA guideline for residential noise (55 dBA) at a distance of about 1,600 feet (USEPA 1974). Rural background noise in wilderness and rural areas is typically near 40 dBA (USEPA 1978). The effects of noise generated by construction would be alleviated, to some extent, by air absorption, terrain, and vegetation.

BMPs to reduce the impacts of noise are: NOISE-1 (limit noisy construction activities [including blasting] to the least noise-sensitive times of day [i.e., daytime only between 7 a.m. and 10 p.m.]) and NOISE-2 (ensure that all equipment has sound-control devices no less effective than those provided on the original equipment). Also, a Blasting Plan, which would identify methods and measures to minimize the effects of blasting, would be implemented (TWE-53). While noise levels at 55 dBA would be approximately 15 dBA higher than the ambient rural noise level, this would not be a permanent increase, but an impact that would end once construction ceases (approximately 2.5 years project-wide, but much shorter in localized areas).

Potential power line noise during the operation phase can result from corona discharge, which is the electrical breakdown of air into charged particles. While hardly audible at the edge of the ROW in dry weather, in humid wet conditions, water drops collecting on the lines provide favorable conditions for corona discharges. During a rainfall event, noise from corona discharge emanating from a power line would be at 39 dBA, at approximately 50 feet from the center of the tower. This would equal the noise being generated in a library (BPA 1996). In general, because of the arid climate in the analysis area and existing ambient noise, such as wind and wildlife, the impact of corona noise is expected to be negligible. Noise from traffic during the operations phase would range from light- to medium-duty vehicles, and is expected to be negligible. Overall, the noise levels of operations would be lower than the noise levels associated with short-term construction activities, and in conjunction with the existing ambient noise, would result in a negligible impact to noise sensitive receptors in the analysis area.

As a result of the potential risk of noise exceeding USEPA guidelines during construction, the mitigation measure below is recommended in addition to the proposed design features and BMPs.

***PH -1**: Develop, implement, and maintain a noise complaint reporting and review process to deal with potential queries and issues as they arise. This would include a toll-free telephone number for receiving*

question or complaints during Project construction and a public liaison person before and during Project construction to respond to concerns over noise.

By notifying sensitive receptors in advance, an opportunity is given to leave the area during construction activities or to prepare for construction-related noise; however, residences beyond 300 feet of construction activities who would not be notified would still be within the range elevated levels of construction noise, without the benefit of advance notice.

Only minor impacts to noise sensitive receptors due to construction are anticipated as a result of the implementation of the TWE-53, BMPs NOISE-1 and NOISE-2, the proposed mitigation measure **PH-1**, and the remote and rural project location.

EMF, Corona, Stray and Induced Voltage

Impacts from EMF, corona, and stray and induced voltage during operations are expected to be minimal due to the lack of communities, areas of public gathering, and recreation sites within 1 mile of the Northern terminal areas. Regular monitoring required by TWE-54 would minimize EMF and noise effects. Furthermore, necessary mitigation would be applied to eliminate effects related to induced currents and voltages on conductive objects sharing the 250-foot-wide transmission line ROW (TWE-52). Implementation of TWE-49 and TWE-50 would reduce corona effects and noise. Design specifications include the use of materials designed to minimize radio and TV interference due to corona, as well as the use of regular surveillance patrols to identify and quickly repair any damaged insulators that may cause corona. In areas within the terminal where the AC transmission system could cause shock by electrostatic and electromagnetic AC induction, all buildings, fences, and other structures with metal surfaces located within 300 feet of the centerline would be grounded. All metal irrigation systems and fences that parallel the AC transmission line for distances of 500 feet or more and are within 300 feet of the centerline would be grounded. Additionally, all fences that cross under the AC transmission line also would be grounded (**Appendix D**).

Minimal to no impacts to public health are anticipated from EMF, corona, or stray and induced voltage due to the implementation of TWE-49, TWE-50, TWE-52, and TWE-54, which are the measures indicated in the PDTR (**Appendix D**), as well as the remote nature of the terminal area and the lack of sensitive receptors and land uses such as communication sites, residences, and hospitals.

Hazardous Materials

Impacts related to the presence of hazardous materials could result with an accidental release of hazardous materials from transportation and use during construction. These impacts are often the result of improper handling or storage of hazardous materials. The environmental effects of a release would depend on the material released and the location of the release. Potential releases could include a small amount of fuel spilled during a transfer operation at the right-of-way to the loss of several thousand gallons of fuel into a riparian drainage. Impacts from spills would typically be minor because of the low frequency of spill occurrence, relatively low volume of materials being handled, and the small volume of spills. As part of the COM Plan, the applicant would prepare and provide a Spill Prevention Notification and Cleanup Plan (TWE-57). The Plan would include spill prevention measures, notification procedures and employee awareness training to reduce the potential of hazardous materials releases or spills.

Impacts associated with the release or spill of hazardous materials to the environment or people during construction are expected to be minimal with the implementation of TWE-57.

During construction, contaminated soil and/or groundwater (e.g. hydrocarbon contamination) could be encountered. Work would be suspended in the area of suspected contamination until the type and extent of the contamination is determined. The specific procedures for handling the discovery of potentially contaminated soils would be described in the Hazardous Materials Management Plan as part

of the COM Plan (TWE-61). The Applicant and appropriate environmental agencies would be contacted as required by law (TWE-62).

If unanticipated contaminated soil or groundwater is encountered during construction, procedures described in the Hazardous Materials Management Plan would be implemented (TWE-61) and the proper authorities notified (TWE-62).

Southern Terminal

The two options for the southern terminal would be sited near Boulder City, Nevada, and would require an initial disturbance of 412 acres for construction and a permanent disturbance of 203 acres for operation.

There are no communication sites, residences, structures, communities or parks or developed recreation areas within 1 mile of the proposed terminal sites, nor are there sensitive receptors located within 1 mile of the terminal sites. The lack of sensitive receptors near the terminal sites would result in no impacts from noise and EMF.

During construction of the Southern terminal, workers would be at risk of injury from use of heavy equipment, working at heights, working in the vicinity of high voltage equipment, as well as from typical hazards found on a construction site. Based on BLS data from 2010, there are four construction-related non-fatal recordable incidents per 100 full-time equivalent workers. Based on an average construction workforce of approximately 500 workers, it is estimated there would be 20 non-fatal recordable incidents. In order to minimize hazards to construction workers that may result in injuries that meet or exceed the BLS threshold, workers would follow the NESC, U.S. Department of Labor requirements, and OSHA safety standards, as well as project-specific safety requirements (TWE-51). A health and safety plan also would be implemented to protect workers and the public during construction (TWE-56).

The same BMPs and design features used for the Northern Terminal would be implemented for construction and operation of the Southern Terminal, resulting in similar impacts to public health and safety.

The implementation of TWE-51, TWE-56, and TWE-64 and adherence to NESC, U.S. Department of Labor requirements, and OSHA safety standards would reduce or eliminate the risk of serious injuries. Only minor construction related impacts are anticipated due to the implementation of the TWE-53, BMPs NOISE-1 and NOISE-2, and the proposed mitigation measure **PH-1**. Minimal to no impacts to public health are anticipated from EMF, corona, or stray and induced voltage due to the implementation of TWE-49, TWE-50, TWE-52, and TWE-54, the measures indicated in the PDTR (**Appendix D**), and the lack of sensitive receptors, residences, and hospitals. Impacts associated with the release or spill of hazardous materials to the environment or people during construction or discovery of contaminated soil or groundwater are expected to be minimal with the implementation of TWE-57 and TWE-62.

3.18.7.2 Impacts Common to all Alternative Routes and Associated Components

Potential effects of construction, operation, and decommissioning on public health and safety are discussed below for each of the resource issues listed in **Table 3.18-4**. After potential impacts are identified, relevant agency BMPs and design features are discussed in terms of reducing impacts. If impacts remain after application of BMPs and design features, additional mitigation is recommended to reduce impacts.

Construction Impacts

The same BMPs and design features used during terminal construction to reduce risk of occupational injury, impacts from fire, noise or hazardous materials would be implemented for construction and

operation of the alternative routes and associated components, resulting in similar impacts to public health and safety.

The implementation of TWE-51, TWE-56, and TWE-64 would reduce or eliminate the risk of serious injuries. Only minor construction related impacts to noise sensitive receptors are anticipated as a result of the implementation of TWE-53, BMPs NOISE-1 and NOISE-2, and the proposed mitigation measure **PH-1**. Impacts associated with the release or spill of hazardous materials to the environment or people during construction or discovery of contaminated soil or groundwater are expected to be minimal with the implementation of TWE- 57 and TWE-62.

Operation Impacts

The effects of operation of the Project would involve potential EMF impacts on residences, sensitive receptors, nearby communities, recreation areas, lightning, corona effect on communication sites, stray and induced voltage, noise, fire, and the health and safety of maintenance workers. Most of the impacts associated with operation activities would be separate and unique from the types of effects discussed for construction activities.

Electrocution

The transmission lines would be operated according to the NESC and are designed to minimize the risk for shock (TWE-51). Therefore, the risk of electrocution during operation would be negligible. The shock a human or animal would receive by touching a metal object near a transmission line would be similar to that received after walking across carpet. Only maintenance and contract workers would be expected to be near the transmission lines. The public would be directly exposed to transmission lines if the lines were cut or otherwise downed, in which case, the lines are designed to trip out of service (turn off). Transmission lines would be monitored and maintained so the likelihood of this event is minimized.

Lightning

Potential adverse health effects associated with lightning strikes would be minimized by the presence of the overhead ground wire and optical ground wire that shield the conductors. The current from a lightning strike is diverted to the ground at the adjacent structure. When the current is discharged from the structure base to the surrounding ground, a step potential voltage can momentarily exist on the ground near the structure, presenting an electrocution hazard. Therefore, workers and the public should avoid structures during a lightning storm.

Through the implementation of the TWE-51, impacts to public health and safety from electrocution and lightning during operations would not be expected.

EMF, Corona Noise, and Stray Voltage

High voltage DC transmission lines, as opposed to high voltage AC transmission lines, produce a constant static electric and magnetic field that decrease rapidly from the transmission line source. The natural geomagnetic field varies from 350 to 700 mG. Man-made devices that use DC, such as electric trains and some industrial use equipment, can produce a magnetic field up to 1,000 times as strong as what is produced naturally. Medical devices such as MRIs can produce magnetic fields up to 100,000 times stronger than the naturally occurring magnetic field. The estimated magnetic field strength directly beneath a 600 kV DC transmission line when at full capacity is expected to be approximately 875 mG, and 425 mG when at half capacity, averaging about the same as recorded naturally on the earth's surface. The strength of the field decreases rapidly with distance. The average magnetic field drops to 150 mG when 200 feet from the centerline, and 100 mG when 300 feet from the centerline (TWE 2011).

The recommended maximum static magnetic field exposure value from the World Health Organization (WHO) is 200,000 mG during the working day for occupational exposure. Exposure from the proposed Project would be considerably less than the WHO recommendation, equaling the same exposure level

as what occurs naturally. It also is much less than the recommended exposure level (5,000 mG) for cardiac pacemakers and other implanted electronic devices (WHO 2006). The nominal static electric field produced directly underneath a 600 kV line is less than 20 kV/m. This drops to less than 5 kV/m at 100 feet from the centerline (TWE 2011). The results of the few electric static studies that have been conducted indicate that the only effects are associated with body hair movement and discomfort from spark discharges (WHO 2006). The magnetic field of a DC transmission line, unlike an AC transmission line, does not affect paralleling objects such as pipelines (Bailey et al. 1996).

Transmission lines would be designed to minimize electric and magnetic fields. The practice of prudent avoidance is based on limiting exposure to electric and magnetic fields, to the extent practical. Using this approach, transmission lines would not be routed in proximity to residential structures, schools, or other sensitive facilities to the extent practical. TWE-54 would be implemented to minimize EMF and noise effects from operating the transmission lines. As a result of the low level of static electric and magnetic fields that would be produced under and near the proposed transmission line, and the applicant's commitment to route away from sensitive land uses when practical, impacts from EMF would be reduced or non-existent.

Stray voltage and induced current are not produced by the type of EMF from DC transmission lines; however, necessary mitigation would be applied to eliminate effects related to induced currents and voltages on conductive objects sharing the 250-foot-wide transmission line ROW (TWE-52).

Corona on the surface of high voltage conductors can create signals that may interfere with radio and television reception. Modern transmission line design has reduced corona to a minimum and such design is proposed for the proposed Project. Occasionally, more sensitive radio and television sets pick up on "corona noise." Problems would be addressed on a case-by-case basis. Although corona can cause television and radio reception interference, it does not represent a threat to human health or safety. TWE-49 and TWE-50 would be implemented to reduce the effects of corona and noise. These design features include the use of materials designed to minimize audible noise and radio and TV interference due to corona, as well as the use of regular patrols so that damaged insulators, which may cause corona would be quickly repaired. It is anticipated that the implementation of these design features would prevent disruption of emergency communications.

Under Design Option 2, in addition to the proposed TWE Project, a 500-kV AC transmission line would be constructed approximately 350 miles in length, between the new AC/DC converter station in Utah to one of the existing substations in Eldorado Valley, south of Boulder City, Nevada (Marketplace Hub). The 500-kV AC portion of this design option would transect Regions III and IV. Design Option 3 also would utilize AC transmission. Under Design Option 3, Phase I, AC transmission lines would be constructed instead of DC transmission lines. Under Phase 2, AC transmission lines would be converted to DC.

As discussed in Section 3.18.4, EMF from an AC line differs from a DC line in that electric and magnetic fields are oscillating and not static. The electric field measurements at 300 and 125 feet from the centerline of a 500 kV power line during peak usage would both be less than 1.0 kV/M (SDGE 2006). This is well below the voluntary threshold of 4.2-kV/m established by the ICNIRP. The anticipated magnetic field measurements at 300 and 135 feet from the centerline during peak usage would equal approximately 3 mG and 25 mG, respectively, slightly more than a fluorescent light and a can opener at 2 feet (EM Watch 2011). Both electric and magnetic fields drop considerably as distance increases from the centerline. Based on predicted estimates, magnetic and electric fields are expected to diminish rapidly between 50 to 100 feet from the centerline and are insignificant more than 100 feet from the edge of the 250-foot-wide transmission line ROW (TWE 2011).

Unlike DC transmission lines, AC transmission lines can cause induced current in nearby objects. Induced current occurs along linear features, such as fences that parallel conductors, and can typically be minimized with adequate grounding. In order to minimize the potential for electric shock, buildings,

fences, and other structures with metal surfaces located within 300 feet of the centerline would be grounded. All metal irrigation systems and fences that parallel the AC transmission line for distances of 500 feet or more and are within 300 feet of the centerline would be grounded. Additionally, all fences that cross under the AC transmission line also would be grounded (PDTR, **Appendix D**).

Approximately 55 percent of this design option from IPP to Marketplace Hub that would be constructed using AC power lines is co-located with existing utility corridors that may contain pipelines. When a high voltage AC transmission line is located adjacent to a pipeline ROW, the pipeline may be subject to electrical interference from electric and magnetic induction. This form of interference is due to the magnetic field produced by the AC current flowing in the conductors of the transmission line coupling with the metallic pipeline, inducing voltage and associated current on the pipeline. In order to minimize the potential for this interference, measures include reducing the impedance of the transmission structure grounds, grounding the pipeline in conjunction with de-couplers, burying gradient control wires along the pipeline, and using dead fronts at test stations. In locations where the final alignment of an AC section of transmission is in close proximity to a pipeline, computer modeling of AC interference effects would be completed and any required mitigation would be designed and installed prior to energizing the transmission line. Similarly, when a high voltage AC transmission line is located adjacent to a railroad, electric and magnetic induction results from the magnetic field and may result in personal safety hazards, damage to signal and communication equipment, and false signaling of equipment. Specifications from the American Railway Engineering and Maintenance-of-Way Association would be followed to ensure safety of railway operating personnel and the public. In addition, railroad signal and equipment manufacturers provide AC interference voltage tolerances for proper signal operation so that nearby transmission facilities can be designed to ensure AC interference levels do not exceed the acceptable safety criteria (**Appendix D**).

Impacts to public health and safety from construction, operation, and decommissioning would be the same as discussed in Section 3.18.7.1, Impacts from Terminal Construction, Operation, and Decommissioning, and Section 3.18.7.2, Impacts Common to All Alternative Routes and Associated Components. Impacts related to DC effects also would be the same as discussed in Section 3.18.7.2. Impacts would differ from previous analysis at the ground electrode bed system in Region III. The siting of the proposed ground electrode bed system for Design Option 2 Region III is located within an area that has not previously been analyzed in this section. There is a recreation area (Little Sahara Recreation Area) and a wildlife study area (Fish Springs) within 1 mile of the proposed ground electrode bed system. There would be no communities or communication sites within a mile of the proposed location. There are no structures within 500 feet of the reference line. The terminal location for Design Option 2 would be sited near IPP and would require an initial disturbance of 181 acres for construction and a permanent disturbance of 118 acres for operation. There are no communication sites, residences, communities, parks, developed recreation areas, or other sensitive receptors within 1 mile of the proposed terminal site. The lack of sensitive receptors near the terminal site would result in no impacts from noise and EMF. Impacts from construction would be similar to those detailed for the Southern and Northern Terminals.

Impacts to public health and safety would be the same as discussed in Section 3.18.7.1, Impacts from Terminal Construction, Operation, and Decommissioning, and Section 3.18.7.2, Impacts Common to All Alternative Routes and Associated Components. Impacts as a result of the AC portion of the design option would be the same as Design Option 1. The Phase 1 AC portion of this design option would transect Regions I and II, but would be converted to DC under Phase 2.

Through the implementation of TWE-49, TWE-50, TWE-52, and TWE-54, as well as the mostly remote location of the proposed project and the limited number of sensitive receptors adjacent to the reference line, minimal to no impacts to public health are anticipated from EMF, corona, stray voltage, or induced current.

Occupational Safety

During operations, there would be a slight risk for injuries to maintenance workers who travel in the 250-foot-wide transmission line ROW to perform maintenance on the transmission lines. To minimize risk, safety measures would be taken that include enforcing red flag warnings, providing appropriate training to all pertinent personnel, keeping vehicles on or within designated roads or work areas, and adherence to NESC, U.S. Department of Labor requirements, and OSHA safety standards. Additionally, to reduce the risk to maintenance workers and the public from herbicide application, herbicides would be applied according to label instructions and within recommended rates. As noted, in Section 3.5, Vegetation, mitigation measure NX-3 would be implemented to ensure herbicide application would follow all applicable state and federal laws.

Through the implementation of proposed safety measures, such as enforcing red flag warnings, providing appropriate training to personnel, and adherence to national safety standards, negligible to no impacts from routine maintenance activities are anticipated.

Fire

To minimize the occurrence of fire from the power line, safety measures would be taken that include brush-clearing within the corridor prior to work, enforcing red flag warnings, providing appropriate training to all pertinent personnel, and keeping vehicles on or within designated roads or work areas. To minimize the impacts of fire during operations, a Fire Protection Plan would be implemented (TWE-64). Additionally, in the event the lines were cut or otherwise downed, the lines are designed to trip out of service (turn off), reducing the chances of fire.

Through the implementation of proposed safety measures, such as implementation of TWE-64, brush-clearing within the corridor prior to work, enforcing red flag warnings, providing appropriate training to all pertinent personnel, keeping vehicles on or within designated roads or work areas, as well as modern transmission line design, negligible to no impacts from fire are anticipated.

Hazardous Materials

Table 3.18-3 lists the various hazardous materials that would be used in the operation of the transmission line and associated facilities. The procedures for safe handling of these materials would be covered in the Spill Prevention Notification and Cleanup Plan (TWE-57) and is covered by a number of regulatory programs as described in Section 3.18.1, Regulatory Framework.

Impacts associated with the release or spill of hazardous materials to the environment or people during operations are expected to be minimal with the implementation of TWE-57.

Intentional Destructive Acts

The proposed transmission lines, terminals and other associated facilities could be targets of intentional destructive acts, including sabotage or terrorism. More common, intentional acts of destruction would include vandalism or theft. Acts of vandalism and theft are more likely to occur than acts of sabotage and terrorism and are most likely to occur at remote areas and at substations. Theft frequently involves equipment and salvageable metal at substations and switchyards. Vandalism often includes shooting out insulators. Sabotage and terrorism would most likely include destruction of key transmission line components with the intent of interrupting the electrical grid. Impacts from intentional destructive acts could range from no noticeable effect on electrical service to a disruption of service. Cameras, and signs and regular inspections of the 250-foot-wide transmission line ROW and facilities by operations personnel would be used as needed to prevent theft, vandalism, and unauthorized access. Additionally, safety and security lighting, as well as security fencing, would be installed at each terminal, substation, and series compensation station. Security staff would consist of support operations and maintenance workers. Reponses to intentional destructive acts would be implemented in accordance with the Proponents' emergency response plan.

Impacts associated with intentional destructive acts are expected to be minimal with the implementation of regular ROW monitoring, cameras, signage, and fencing, as well as the Proponents' emergency response plan.

Decommissioning Impacts

Health and safety impacts for this phase of the Project would be reduced in frequency compared to the construction phase, due to the shorter time period**.** The same BMPs and design features used in construction would be applied to reduce impacts during decommissioning activities.

3.18.7.3 Region I

Table 3.18-6 provides a tabulation of impacts associated with the alternative routes in Region I.

Table 3.18-6 Summary of Region I Alternative Route Impacts for Public Health and Safety, Hazardous Materials

Parameter		Alternative I-A	Alternative I-B	Alternative I-C	Alternative I-D
Communities		0	0	1	0
Parks or developed/dispersed recreation areas (campgrounds, etc)		0	0	0	0
Other Sensitive Receptors (schools and daycare centers; health care facilities such as hospitals or retirement and nursing homes; cemeteries; churches)		0	0	0	0
Communication Sites		12	13	17	9
Structures Within 500 feet of the Reference Line	Residential	0	0	9	0
	Commercial/Industrial	45	47	24	39
	Agricultural	0	0	0	0
	Outbuilding	3	7	11	3
Structures Within 200 feet of the Reference Line	Residential	0	0	0	0
	Commercial/Industrial	11	9	4	9
	Agricultural	0	0	0	0
	Outbuilding	3	3	4	3

Alternative I-A (Applicant Proposed)

Alternative I-A would cross 12 communication sites within the 2-mile transmission line corridor in Region I. There are 45 commercial/industrial structures and 3 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 11 commercial/industrial structures, but stays the same with 3 outbuildings within 200 feet of the proposed reference line. The majority of the commercial/industrial structures are oil and gas pads. There would be no recreation areas, communities or sensitive receptors within the 2-mile transmission line corridor. Alternative I-A contains the most commercial/industrial buildings within 200 feet of the reference line. Under Design Option 3, Phase 1, AC transmission lines instead of DC transmission lines would be constructed. Under Phase 2, AC transmission lines would be converted to DC. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative I-B

Alternative I-B would cross 13 communication sites within the 2-mile transmission line corridor in Region I. There are 47 commercial/industrial structures and 7 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 9 commercial/industrial structures and 3 outbuildings within 200 feet of the proposed reference line. The majority of the commercial/industrial structures are oil and gas pads. There are no recreation areas, communities, or sensitive receptors within the 2-mile transmission line corridor. Under Design Option 3, Phase 1, AC transmission lines instead of DC transmission lines would be constructed. Under Phase 2, AC transmission lines would be converted to DC. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative I-C

Alternative I-C would cross 17 communication sites and 1 community within the 2-mile transmission line corridor in Region I. The community within the corridor is Craig, located 0.3 mile from the reference line. The portion of Craig located near the reference line is the Craig South Highlands subdivision. Juniper Hot Springs in Colorado, is located 1 mile from the reference line, but is a resort, not a community. The 2010 census population for Craig was 9,964. There are 9 residential structures, 24 commercial/industrial structures, and 11 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 4 commercial/industrial structures and 4 outbuildings within 200 feet of the proposed reference line. The majority of the commercial/industrial structures are oil and gas pads. There are no dispersed camping recreation areas within the 2-mile transmission line corridor. Alternative I-C contains the most communication sites and communities within the 2-mile transmission line corridor, but also the fewest structures within 200 feet of the reference line. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to significantly affect public health and safety.

Alternative I-D (Agency Preferred)

Alternative I-D would cross 9 communication sites within the 2-mile transmission line corridor in Region I. There are 39 commercial/industrial structures and 3 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 9 commercial/industrial structures and 3 outbuildings within 200 feet of the proposed reference line. The majority of the commercial/industrial structures are oil and gas pads. There would be no recreation areas, communities or sensitive receptors within the 2-mile transmission line corridor. Under Design Option 3, Phase 1, AC transmission lines would be constructed. The Tuttle Easement micro-siting options would not substantially affect the impact analysis for public health and safety. Under Phase 2, AC transmission lines would be converted to DC. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative Connectors in Region I

Table 3.18-7 summarizes impacts associated with the alternative connectors in Region I.

Alternative Ground Electrode Systems in Region I

Table 3.18-8 provides a comparison of alternative electrode facility locations proposed within 10 to 100 miles of the Northern Terminal. Some locations might serve multiple alternative routes, while others could only be associated with a certain alternative route.

Table 3.18-7 Summary of Region I Alternative Connector Impacts for Public Health and Safety, Hazardous Materials

Alternative Connector	Analysis
Mexican Flats Alternative Connector	There are no communities, sensitive receptors, recreation areas, or communication sites within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.
Baggs Alternative Connector	There are no communities, sensitive receptors, recreation areas, or communication sites within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.
Fivemile Point North Alternative Connector	There are no communities, sensitive receptors, recreation areas, or communication sites within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.
Fivemile Point South Alternative Connector	There are no communities, sensitive receptors, recreation areas, or communication sites within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.

Table 3.18-8 Summary of Region I Alternative Ground Electrode System Location Impacts for Public Health and Safety, Hazardous Materials

Alternative Ground Electrode System Locations	Analysis
Separation Flat (All Alternatives)	There are no communities, sensitive receptors, recreation sites, or communication sites within 1 mile of the proposed ground electrode system location or its associated transmission line. There are no structures within 500 feet of the reference line.
Shell Creek (Alternatives I-A, I-B, and I-D)	There are no communities, sensitive receptors, recreation sites, or communication sites located within 1 mile of the proposed ground electrode system location or its associated transmission line. There are no structures within 500 feet of the reference line.
Little Snake East (Alternatives I-A, I-B, and I-D)	There are no communities, recreation sites, or communication sites located within 1 mile of the proposed ground electrode system location or its associated transmission line. There is one residential structure 350 feet from the edge of the siting area and slightly over 1 mile from the edge of the site. There are no structures within 500 feet of the reference line.
Little Snake West (Alternatives I-A, I-B, and I-D)	There are no communities, sensitive receptors, recreation sites, or communication sites located within 1 mile of the proposed ground electrode system location or its associated transmission line. There are no structures within 500 feet of the reference line.
Shell Creek (Alternatives I-A, I-B, and I-D)	There are no communities, recreation sites, or communication sites located within 1 mile of the proposed ground electrode system location or its associated transmission line. There is one residential structure within the site area, but over 4 miles from the site location. There are no structures within 500 feet of the reference line.
Little Snake West (Alternatives I-A, I-B, and I-D)	There are no communities, sensitive receptors, recreation sites, or communication sites located within 1 mile of the proposed ground electrode system location or its associated transmission line. There are no structures within 500 feet of the reference line.
Eight Mile Basin (All Alternatives)	There are no communities, sensitive receptors, recreation sites, or communication sits located within 1 mile of the proposed ground electrode system location or its associated transmission line. There are no structures within 500 feet of the reference line.

Region I Conclusion

Alternative I-A, Alternative I-B, Alternative I-C, and Alternative I-D (Agency Preferred) would have similar impacts on public health and safety, with the exception that, as detailed in **Table 3.18-6**, Alternative I-C would affect a greater number of communities and residential structures than the remaining alternatives. This would increase the potential project construction and operation health and safety risk to residential

occupants. However, the successful implementation of design features, BMPs, and mitigation **PH-1**, would result in all of the alternatives having a relatively low impact on public health and safety.

3.18.7.4 Region II

Table 3.18-9 provides a tabulation of impacts associated with the alternative routes in Region II.

Table 3.18-9 Summary of Region II Alternative Route Impacts for Public Health and Safety, Hazardous Materials

Parameter		Alternative II-A	Alternative II-B	Alternative II-C	Alternative II-D	Alternative II-E	Alternative II-F
Communities		9	11	11	11	16	10
Parks or developed and dispersed recreation areas (campgrounds, etc)		18	4	3	6	15	6
Other Sensitive Receptors (schools and daycare centers; health care facilities such as hospitals or retirement and nursing homes; cemeteries; churches)		3	2	2	5	6	3
Communication Sites		38	91	138	84	77	99
Structures Within 500 feet of the Reference Line	Residential	53	5	4	6	35	13
	Commercial/ Industrial	31	17	12	1	20	0
	Agricultural	0	0	3	0	0	0
	Outbuilding	11	9	11	0	6	6
Structures Within 200 feet of the Reference Line	Residential	4	3	1	0	5	0
	Commercial/ Industrial	4	5	4	0	0	0
	Agricultural	0	0	1	0	0	0
	Outbuilding	1	1	3	0	1	4

Alternative II-A (Applicant Proposed)

Alternative II-A would cross 38 communication sites, 18 parks (includes 14 wildlife management areas), 9 communities, 1 cemetery, 1 school, and 1 church within the 2-mile transmission line corridor in Region II. The community of Nephi is transected by the reference line. The only communities within the 2-mile transmission line corridor that have census data are Nephi and Roosevelt City, with 2010 populations of 5,389 and 6,046, respectively. A full list of communities, parks and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-10**. There are 53 residential structures, 31 commercial/industrial structures, and 11 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 4 residential structures, 4 commercial/industrial structures, and 1 outbuilding within 200 feet of the proposed reference line. The majority of the commercial/industrial structures are oil and gas pads. There are 3 dispersed recreation areas within the 2-mile transmission line corridor, the nearest being approximately 1,215 feet from the reference line. Alternative II-A contains the least number of communities within the 2-mile transmission line corridor. The Strawberry IRA and Cedar Knoll IRA micro-siting adjustments would not substantially affect the impact analysis for public health and safety. Sand dunes within Alternative II-A also may affect the safety of workers and the public during construction and operation (see Section 3.3 for further details). Under Design Option 3, Phase 1, AC transmission lines instead of DC transmission lines would be constructed. Under Phase 2,

Table 3.18-10 Human Resources by Alternative within Region II

	Alternative II-A	Alternative II-B	Alternative II-C	Alternative II-D	Alternative II-E	Alternative II-F
Communities*	(Utah) Ioka, Upalco, Pines, Rio, Thistle, Gypsum Mill, Champlin, Nephi, Roosevelt City	(Colorado) Carbonera (Utah) Thompson Springs, Desert, Elba, Floy, Sagers, Vista, Cedar, Woodside, Nephi, Mount Pleasant	(Colorado) Carbonera (Utah) Thompson Springs, Desert, Elba, Floy Sagers, Vista, Emery, Moore, Harding, McCornick	(Utah) Red Wash, Squaw Crossing, Martin, Heiner, Wildcat, Coal City Clear Creek, Milburn, Champlin, Nephi, Helper	(Utah) Red Wash, Colton, Gilluly, Kyune, Mill Fork, Sky View, Soldier Summit, Tucker, Ioka, Pines, Rio, Thistle, Bridgeland, Champlin, Nephi, Roosevelt City	(Utah) Red Wash, Squaw Crossing, Gilluly, Mill Fork, Sky View, Soldier Summit, Tucker, Pines, Rio, Thistle
Parks or Developed Recreation Areas	(Utah) Currant Creek Wildlife Management Area (WMA), North Nebo WMA, Northwest Manti WMA (Birdseye), Northwest Manti WMA (Dairy Fork), Northwest Manti WMA (Hilltop), Northwest Manti WMA (Starvation), Strawberry River WMA, South Nebo WMA, Tabby Mountain WMA (Rabbit Gulch), Tabby Mountain WMA, Rabbit Gulch WMA, Wildcat WMA, Jackson WMA, Spencer Fork WMA, Strawberry River Day Use Area, Starvation State Park	(Utah) Triangle Ranch WMA, North Nebo WMA (Found Green), South Nebo WMA, Green River State Park	(Utah) Emery Farm Castle Dale Wildlife Management Area (WMA), Fillmore WMA, Green River State Park	(Utah) Triangle Ranch WMA, Hilltop WMA, Gordon Creek WMA, Northwest Manti WMA (Hilltop), South Nebo WMA (Triangle Ranch), Castle Gate Park	(Utah) Dairy Fork WMA, Jackson WMA, Spencer Fork WMA, Triangle Ranch WMA, Indian Canyon WMA, North Nebo WMA (Spencer Fork), Northwest Manti WMA (Birdseye), Northwest Manti WMA (Dairy Fork), Northwest Manti WMA (Lasson Draw), Northwest Manti WMA (Starvation), South Nebo WMA, and Bamberger Monument	(Utah) Dairy Fork WMA, Jackson WMA, Spencer Fork WMA, Triangle Ranch WMA
Other Sensitive Receptors	(Utah) Fruitland Cemetery, Church of Jesus Christ of Latter Day Saints, Church of Jesus Christ of Latter Day Saints	(Utah) Thompson Cemetery, Woodside Cemetery, Church of Jesus Christ of Latter Day Saints	(Utah) Thompson Cemetery, Church of Jesus Christ of Latter Day Saints	(Utah) Deadmans Grave Cemetery, Castle Gate Cemetery, Saint Anthony School, Sally Mauro School, Saint Anthony Catholic Church	(Utah) Deadmans Grave, Mill Fork Cemetery, Old Lake Cemetery, Church of Jesus Christ of Latter Day Saints, Church of Jesus Christ of Latter Day Saints	(Utah) Deadmans Grave, Mill Fork Cemetery, Church of Jesus Christ Latter Day Saints

* Some communities do not have census population data, are rural in nature, and may no longer be inhabited.

AC transmission lines would be converted to DC. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative II-B

Alternative II-B would cross 91 communication sites, 11 communities, 4 parks (includes 3 wildlife management areas and a state park), and 2 cemeteries within the 2-mile transmission line corridor in Region II. The nearest community within the corridor to the reference line is Nephi, Utah, which is transected by the reference line. Thompson Springs and Nephi, both in Utah, are the only communities within the 2-mile transmission line corridor that have census population data. The 2010 populations of Thompson Springs and Nephi were 39 and 5,389, respectively. A full list of communities, parks and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-10**. There are 5 residential structures, 17 commercial/industrial, and 9 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 3 residential structures, 5 commercial/industrial structures, and 1 outbuilding within 200 feet of the proposed reference line. The majority of the commercial/industrial structures are oil and gas pads. Of the 145 recreation areas within the 2-mile wide corridor, all except four are dispersed recreation campsites. Alternative II-B contains the most recreation areas among the project alternatives. Under Design Option 3, Phase 1, AC transmission lines instead of DC transmission lines would be constructed. Under Phase 2, AC transmission lines would be converted to DC. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative II-C

Alternative II-C would cross 138 communication sites, 11 communities, 3 parks (includes 1 state park and 2 wildlife management areas), 1 church, and 1 cemetery that are within the 2-mile transmission line corridor in Region II. The nearest community within the corridor to the reference line is Carbonera, Colorado, located approximately 155 feet from the reference line. There is no census population data for Carbonera. Thompson Springs and Emery, both in Utah, are the only communities within the 2-mile transmission line corridor that have census population data. The populations of Thompson Springs and Emery in 2010 were 39 and 208, respectively. A full list of communities, parks and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-10**. There are 4 residential structures, 12 commercial/industrial structures, 3 agricultural structures, and 11 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 1 residential structure, 1 agricultural structure, 4 commercial/industrial structures, and 3 outbuildings within 200 feet of the proposed reference line. The majority of the commercial/industrial structures are oil and gas pads. There are no dispersed recreation areas within the 2-mile transmission line corridor. Alternative II-C contains the most communication sites among the project alternatives. Under Design Option 3, Phase 1, AC transmission lines instead of DC transmission lines would be constructed. Under Phase 2, AC transmission lines would be converted to DC. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative II-D

Alternative II-D would cross 84 communication sites, 11 communities, 6 parks (includes 5 wildlife management areas), 2 cemeteries, 1 church, and 2 schools that are within the 2-mile transmission line corridor in Region II. The nearest community within the corridor to the reference line is Nephi, Utah, which is transected by the reference line. Clear Creek, Nephi, and Helper are the only communities within the 2-mile transmission line corridor that have census population data. The 2010 populations were: Clear Creek – 4; Nephi – 5,389; and Helper – 2,201. A full list of communities, parks and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-10**. There are

6 residential structures and 1 commercial/industrial structure within 500 feet of the proposed reference line. There are no structures within 200 feet of the proposed reference line. Of the 30 recreation areas within the 2-mile wide corridors, all except six are dispersed recreation campsites. This alternative has the least amount of structures within 200 feet of the reference line. Sand Dunes within Alternative II-D also may affect the safety of workers and the public during construction and operation (see Section 3.3 for further details). Under Design Option 3, Phase 1, AC transmission lines instead of DC transmission lines would be constructed. Under Phase 2, AC transmission lines would be converted to DC. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative II-E

Alternative II-E would cross 77 communication sites, 16 communities, 15 parks (includes 12 wildlife management areas), 3 cemeteries, 1 school, and 2 churches that are within the 2-mile transmission line corridor in Region II. The nearest community within the corridor to the reference line is Nephi, Utah, which is transected by the reference line. The 2010 populations of Nephi and Roosevelt City were 5,389 and 6,046, respectively. A full list of communities, parks and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-10**. There are 35 residential structures, 20 commercial/industrial structures, and 6 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 5 residential structures and 1 outbuilding within 200 feet of the proposed reference line. The majority of the commercial/industrial structures are oil and gas pads. Of the 15 recreation areas within the 2-mile wide transmission corridor, three are dispersed recreation campsites. Alternative II-E contains the greatest number of communities. Cedar Knoll IRA micro-siting adjustments would not substantially affect the impact analysis for public health and safety. Sand Dunes within Alternative II-A also may affect the safety of workers and the public during construction and operation (see Section 3.3 for further details). Under Design Option 3, Phase 1, AC transmission lines instead of DC transmission lines would be constructed. Under Phase 2, AC transmission lines would be converted to DC. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative II-F (Agency Preferred)

Alternative II-F would cross 99 communication sites, 10 communities, 6 parks (includes 4 wildlife management areas), 2 cemeteries, and 1 church that are within the 2-mile transmission corridor in Region II. The nearest community within the corridor to the reference line is Sky View, Utah, located approximately 685 feet from the reference line. There is no census population data for Sky View, and the community is rural in nature. A full list of communities, parks and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-10**. There are 7 residential structures and 1 commercial/industrial structure within 500 feet of the proposed centerline. There are no structures within 200 feet of the proposed centerline. There are two dispersed recreation areas within the 2-mile transmission line corridor. Cedar Knoll IRA micro-siting adjustments would not substantially affect the impact analysis for public health and safety. Under Design Option 3, Phase 1, AC transmission lines instead of DC transmission lines would be constructed. Under Phase 2, AC transmission lines would be converted to DC transmission lines. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative Variation in Region II

Emma Park Alternative Variation

There are no communities, public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.

Alternative Connectors in Region II

Table 3.18-11 summarizes impacts associated with the alternative connectors in Region II.

Table 3.18-11 Summary of Region II Alternative Connector Impacts for Public Health and Safety, Hazardous Materials

Alternative Connector	Analysis
Highway 191 Alternative Connector	There are no communities, public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor. There is one outbuilding within 500 feet of the reference line.
Castle Dale Alternative Connector	There are no communities, public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor. There no structures within 500 feet of the reference line.
Price Alternative Connector	There are 2 communities (Wattis and Wattis Junction) and 1 park (Gordon Creek Wildlife Management Area) within the 2-mile transmission line corridor. There is no census data for either community. There are no public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.
Lynndyl Alternative Connector	There are no communities, public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor. There is one commercial/industrial structure within 500 feet of the reference line.
IPP East Alternative Connector	There are no communities, public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.

Region II Conclusion

Alternative II-A, Alternative II-B, Alternative II-C, Alternative II-D, Alternative II-E, and Alternative II-F (Agency Preferred) would have similar impacts on public health and safety, with the exception that, as detailed in **Table 3.18-9**, Alternative II-E would affect more communities, residential structures, and other sensitive receptors than the remaining alternatives. This would increase the potential project construction and operation health and safety risk to residential occupants and visitors to sensitive receptors. However, the successful implementation of design features, BMPs, and mitigation **PH-1**, would result in all of the alternatives having a relatively low impact on public health and safety.

3.18.7.5 Region III

Table 3.18-12 provides a tabulation of impacts associated with the alternative routes in Region III.

Alternative III-A (Applicant Proposed)

Alternative III-A would entail crossing 16 communication sites, 1 park (the Jefferson Hunt Monument), 2 communities, the Mountain Meadows NHL and Site, and 1 cemetery that are within the 2-mile transmission line corridor in Region III. The community of Central, Utah, is transected by the reference line. The 2010 population of Central was 613. The community of Jackman, Nevada, is located 420 feet from the reference line. There is no census population data for Jackman. A list of communities, parks

Table 3.18-12 Summary of Region III Alternative Route Impacts for Public Health and Safety, Hazardous Materials

Parameter		Alternative III-A	Alternative III-B	Alternative III-C
Communities		2	8	9
Parks or developed/dispersed recreation areas (campgrounds, etc.)		1	1	1
Other Sensitive Receptors (schools and daycare centers; health care facilities such as hospitals or retirement and nursing homes; cemeteries; churches)		1	1	0
Communication Sites		16	111	117
Structures Within 500 feet of the Reference Line	Residential	7	2	2
	Commercial/Industrial	7	6	7
	Agricultural	1	0	1
	Outbuilding	10	9	10
Structures Within 200 feet of the Reference Line	Residential	2	1	1
	Commercial/Industrial	3	3	4
	Agricultural	0	0	0
	Outbuilding	4	4	4

and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-13**. There are 7 residential structures, 7 commercial/industrial structures, 1 agricultural structure, and 10 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 2 residential structures, 3 commercial/industrial structures, and 4 outbuildings within 200 feet of the proposed reference line. There are 16 dispersed recreation areas within the 2-mile transmission line corridor, the nearest being approximately 315 feet from the reference line. Alternative III-A contains the least communication sites and communities, but the most parks and recreation areas within the 2-mile transmission line corridor. Alternatives III-A and III-C contain the most structures within 200 feet of the reference line. Under Design Option 2, AC transmission lines instead of DC lines would be constructed. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Table 3.18-13 Human Resources by Alternative within Region III

	Alternative III-A	Alternative III-B	Alternative III-C
Communities*	(Utah) Central (Nevada) Jackman	(Utah) Modena, Bery, Heist, Yale Crossing, Zane (Nevada) Acoma, Brown, Moapa	(Utah) Modena, Bery, Heist, Yale Crossing, Zane (Nevada) Yoacham, Horseshoe Bend, Beaverdam, North Las Vegas
Parks or Developed Recreation Areas	(Utah) Jefferson Hunt Monument	(Nevada) Moapa Recreation Center Park	Old State Boundary Historical Marker
Other Sensitive Receptors	Mountain Meadows NHL and Site	Claude G Perkins Elementary School	N/A

* Some communities do not have census population data, are rural in nature, and may no longer be inhabited.

Alternative III-B (Agency Preferred)

Alternative III-B would cross 111 communication sites, 8 communities, 1 park (Moapa Recreation Center Park), and 1 school that are within the 2-mile transmission line corridor in Region III. The community within the corridor nearest to the reference line is Zane, Utah, located approximately 370 feet from the reference line. Moapa Town is the only community within the 2-mile transmission line corridor that has census population data. The 2010 population of Moapa Town was 1,025. A full list of communities, parts and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-13**. There are 2 residential structures, 6 commercial/industrial structures, and 9 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 1 residential structure, 3 commercial/ industrial buildings, and 4 outbuildings within 200 feet of the proposed reference line. There are no dispersed camping or other recreation areas within the 2-mile transmission line corridor. This alternative contains the least structures within the 200 feet of the reference line. Under Design Option 2, AC transmission lines instead of DC lines would be constructed. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative III-C

Alternative III-C would cross 117 communication sites, 9 communities, and 1 park (state boundary historical marker) that are within the 2-mile transmission line corridor in Region III. The community nearest to the reference line is North Las Vegas, Nevada, which intersects the reference line. Beryl, Utah, and North Las Vegas, Nevada, are the only communities within the 2-mile transmission line corridor that have census population data. The 2010 populations of Beryl and North Las Vegas were 197 and 216,961, respectively. A full list of communities, parks and developed recreation areas, and other sensitive receptors can be found in **Table 3.18-13**. There are 2 residential structures, 7 commercial/industrial structures, 1 agricultural structure, and 10 outbuildings within 500 feet of the proposed reference line. The number of structures decreases to 1 residential structure, 4 commercial/ industrial structures, and 4 outbuildings within 200 feet of the proposed reference line. There are no dispersed camping areas within the 2-mile transmission line corridor. Alternative III-C contains the most communication sites within the 2-mile transmission line corridor. Both Alternatives III-A and III-C contain the most structures within 200 feet of the reference line. Under Design Option 2, AC transmission lines instead of DC lines would be constructed. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative Variations in Region III

Table 3.18-14 summarizes potential impacts associated with the alternative variations in Region III.

Table 3.18-14 Summary of Region III Alternative Variation Impacts for Public Health and Safety, Hazardous Materials

Alternative Variation	Analysis
Ox Valley East Alternative Variation (Alternative III-A)	There would be three dispersed camping areas within the 2-mile transmission line corridor of this alternative variation. There also would be 1 residential structure and 1 outbuilding within 500 feet of the reference line. There is one outbuilding within 200 feet of the proposed reference line. This variation would bypass one segment of Alternative III-A. Within this segment is one park (the Mountain Meadows NHL and Site) and a cemetery. There are no structures within 500 feet of the reference line. Bypassing the Mountain Meadows NHL and Site would be the advantage to this alternative variation.
Ox Valley West Alternative Variation (Alternative III-A)	There would be 1 community and 4 dispersed camping areas within the 2-mile transmission line corridor of this alternative variation. There also would be one residential structure within 500 feet

Table 3.18-14 Summary of Region III Alternative Variation Impacts for Public Health and Safety, Hazardous Materials

Alternative Variation	Analysis
	of the reference line. There are no structures within 200 feet of the proposed reference line. This variation would bypass one segment of Alternative III-A. Within this segment is one park (the Mountain Meadows NHL and Site) and a cemetery. There are no structures within 500 feet of the bypassed segment of this reference line. Bypassing the Mountain Meadows NHL and Site would be the advantage to this alternative variation.
Pinto Alternative Variation	There would be 1 community, 1 cemetery, 14 dispersed camping areas, and 7 communication sites within the 2-mile transmission line corridor. The community of Central, Utah, is located 1,800 feet from reference line and had a 2010 population of 613. There are no structures within 500 feet of the reference line. This variation would bypass two segments of Alternative III-A. Within these segments are two parks (including the Mountain Meadows NHL and Site) and a cemetery. There are no structures within 500 feet of the reference line. Bypassing the Mountain Meadows NHL and Site would be the advantage to this alternative variation.

Alternative Connectors in Region III

Table 3.18-15 summarizes potential impacts associated with the alternative connectors in Region III.

Table 3.18-15 Summary of Region III Alternative Connector Impacts for Public Health and Safety, Hazardous Materials

Alternative Connector	Analysis
Avon Alternative Connector	There are no public gathering areas or recreation areas within the 2-mile transmission line corridor; however, there is one community, Avon, Utah. There is no census population data for Avon, which is representative of its rural nature. Avon is located approximately 740 feet from the reference line. There are no structures within 500 feet of the reference line. There are five communication sites within the 2-mile transmission line corridor.
Moapa Alternative Connector	There are no communities, public gathering areas, or recreation areas within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line. There are five communication sites within the 2-mile transmission line corridor.

Alternative Ground Electrode Systems in Region III

Table 3.18-16 provides a comparison of alternative electrode facility locations proposed near the Southern Terminal. Some locations might serve multiple alternative routes, while others could only be associated with a certain alternative route.

Region III Conclusion

Alternative III-A, Alternative III-B (Agency Preferred), and Alternative III-C, as detailed in **Table 3.18-12**, would have similar impacts on public health and safety. The successful implementation of design features, BMPs, and mitigation **PH-1**, would result in all of the alternatives having a relatively low impact on public health and safety.

Table 3.18-16 Summary of Region III Alternative Ground Electrode System Location Impacts for Public Health and Safety, Hazardous Materials

Alternative Ground Electrode System Locations	Analysis
Mormon Mesa- Carp Elgin Rd (Alternatives III-A and III-B)	There would be no communities, public gathering areas, recreation sites, or communication sites located within 1 mile of the proposed ground electrode system location. One communication site is located within a mile of the associated overhead electrical line. There are no structures within 500 feet of the proposed ground electrode system location or overhead electrical line.
Halfway Wash- Virgin River (Alternatives III-A and III-B)	There would be no communities, public gathering areas, recreation sites, or communication sites located within 1 mile of the proposed ground electrode system location or its associated overhead electrical line. There are no structures within 500 feet of the proposed ground electrode system location or overhead electrical line.
Halfway Wash East (Alternatives III-A and III-B)	There would be no communities, public gathering areas, or recreation sites located within 1 mile of the proposed ground electrode system location or overhead electrical line. Ten communication sites are located within a mile of the proposed location. There are no structures within 500 feet of the proposed ground electrode system location or overhead electrical line.
Meadow Valley 2 (Alternative III-C)	There would be no communities, public gathering areas, or recreation sites located within 1 mile of the proposed ground electrode system location. Four communication sites are located with 1 mile of the associated transmission line. There are no structures within 500 feet of the proposed ground electrode system location or its associated transmission line.

3.18.7.6 Region IV

Table 3.18-17 provides a tabulation of impacts associated with the alternative routes in Region IV.

Table 3.18-17 Summary of Region IV Alternative Route Impacts for Public Health and Safety, Hazardous Materials

Parameter		Alternative IV-A	Alternative IV-B	Alternative IV-C
Communities		2	1	1
Parks or developed recreation areas (campgrounds, etc)		0	1	1
Other Sensitive Receptors (schools and daycare centers; health care facilities such as hospitals or retirement and nursing homes; cemeteries; churches)		0	1	0
Communication Sites		20	77	23
Structures Within 500 feet of the Reference Line	Residential	11	9	9
	Commercial/Industrial	3	3	3
	Agricultural	0	0	0
	Outbuilding	0	0	0
Structures Within 200 feet of the Reference Line	Residential	0	0	0
	Commercial/Industrial	2	0	0
	Agricultural	0	0	0
	Outbuilding	0	0	0

Alternative IV-A (Applicant Proposed and Agency Preferred)

Alternative IV-A would cross 2 communities and 20 communication sites within the 2-mile transmission line corridor in Region IV. The communities of Henderson and Boulder City, both in Nevada, are transected by the reference line and had 2010 populations of 257,729 and 15,023, respectively. There are 11 residential structures and 3 commercial/industrial structures within 500 feet of the proposed reference line. The number of structures decreases to two commercial/industrial structures within 200 feet of the proposed reference line. No dispersed camping or other recreation areas are within the 2-mile transmission line corridor. This alternative contains the most structures within 200 feet of the reference line. Under Design Option 2, AC transmission lines instead of DC lines would be constructed. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative IV-B

Alternative IV-B would entail crossing 1 community, 77 communication sites, 1 beach area, and the Nevada State Veterans Home within the 2-mile transmission line corridor in Region IV. The Nevada State Veterans Home is located 1,690 feet from the reference line. The City of Boulder City, Nevada, is transected by the reference line and had a 2010 population of 15,023. There are 9 residential structures and 3 commercial/industrial structures within 500 feet of the proposed reference line. There are no structures within 200 feet of the proposed reference line. There are no dispersed camping areas within the 2-mile transmission line corridor. Alternative IV-B contains the most communication sites among the alternatives within the 2-mile transmission line corridor. Under Design Option 2, AC transmission lines instead of DC lines would be constructed. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative IV-C

Alternative IV-C would entail crossing 1 community, 23 communication sites, and 1 beach area within the 2-mile transmission line corridor in Region IV. The City of Boulder City, Nevada, is transected by the reference line and had a 2010 population of 15,023. There are 9 residential structures and 3 commercial/industrial structures within 500 feet of the proposed reference line. There are no structures within 200 feet of the proposed reference line. There is no dispersed camping or other recreation areas within the 2-mile transmission line corridor. Under Design Option 2, AC transmission lines instead of DC lines would be constructed. Impacts associated with AC transmission lines are detailed in Sections 3.18.7.1 and 3.18.7.2. After considering design features, BMPs and mitigation measure **PH-1**, Project construction and operation would not be expected to affect public health and safety significantly.

Alternative Variations in Region IV

Table 3.18-18 summarizes potential impacts associated with the alternative variations in Region IV.

Table 3.18-18 Summary of Region IV Alternative Variation Impacts for Public Health and Safety, Hazardous Materials

Alternative Variation	Analysis
Marketplace Alternative Variation (Alternative IV-B)	There are no sensitive receptors, recreation areas, or communication sites within the 2-mile transmission line corridor. The city of Boulder City, Nevada, is transected by the alternative variation reference line. There are no structures within 500 feet of the reference line. This variation would bypass one segment of Alternative IV-B. Within this segment in the 2-mile transmission line corridor is one communication site. There is no commercial/ industrial structure within 500 feet of the reference line. There would be no advantage to this alternative variation as a result of the presence of Boulder City within the 2-mile transmission line corridor.

Alternative Connectors in Region IV

Table 3.18-19 summarizes impacts and advantages associated with the alternative connectors in Region IV.

Table 3.18-19 Summary of Region IV Alternative Connector Impacts for Public Health and Safety, Hazardous Materials

Alternative Connector	Analysis
Sunrise Mountain Alternative Connector	There are no communities, public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.
Lake Las Vegas Alternative Connector	There are no public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor; however, there are 2 communication sites and 1 community (Henderson, Nevada). One industrial structure and 1 outbuilding would be within 500 feet of the reference line.
Three Kids Mine Alternative Connector	There are no public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor; however, there is one community (Henderson, Nevada). There are no structures within 500 feet of the reference line.
River Mountains Alternative Connector	There are no public gathering areas, recreation areas, or communication sites within the 2-mile transmission line corridor; however, there is one community (Henderson, Nevada). One industrial structure would be within 500 feet of the reference line.
Railroad Pass Alternative Connector (Alternatives IV-A and IV-B)	Impacts from this alternative would be limited to 3 communities and 6 communication sites. The communities of Texas Acres, Henderson, and Boulder City, Nevada, are located within the 2-mile transmission line corridor. There are no structures within 500 feet of the reference line.

Region IV Conclusion

Alternative IV-A (Agency Preferred), Alternative IV-B, and Alternative IV-C would have similar impacts on public health and safety, with the exception that, as detailed in **Table 3.18-17**, Alternative IV-A would affect a greater number of communities and residential structures than the remaining alternatives. This would increase the potential project construction and operation health and safety risk to residential occupants. However, the successful implementation of design features, BMPs, and mitigation **PH-1**, would result in all of the alternatives having a relatively low impact on public health and safety.

3.18.7.7 Impacts to Public Health and Safety from the No Action Alternative

Under the No Action Alternative, the proposed Project would not be constructed or operated. Human exposures to noise associated with the proposed project would not occur. There would be no safety concerns from construction of the proposed Project. Existing EMF levels and health and safety considerations from transmission lines and substations in the area would continue. No hazardous materials would be used, released, or uncovered.

3.18.7.8 Residual Impacts

Residual impacts are impacts to a resource remaining after implementation of mitigation measures. For the proposed Project, these residual impacts include the increase in noise levels in excess of USEPA guidelines to residences near construction activities. These residual impacts would be short-term, ending once construction activities were completed in a given area.

3.18.7.9 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible commitment of resources associated with public health and safety. Impacts related to residences from construction noise would be irretrievable, ending however, once construction activities were completed in a given area.

3.18.7.10 Relationship Between Local Short-term Uses and Long-term Productivity

There would be relationship between local short-term uses and long-term productivity associated with public health and safety.