3.11 Public Health and Safety

3.11.1 Affected Environment

3.11.1.1 Power Plant Safety

Natural gas power plants have very good operating safety records. Because natural gas-fired power plants operate in a similar way to natural gas pipelines, the safety record for pipelines is indicative of that for power plants (see natural gas pipelines below). The risk of damage to power plant facilities from accidental and intentional damage from outside parties is very low because public access is not allowed onto fenced plant sites, and plant security can be staffed at levels appropriate to the potential outside threats, such as terrorism.

The Wanapa Energy Center is geographically isolated (approximately 1.2 miles) from the nearest occupied structure, which is the Two Rivers Correctional Facility.

3.11.1.2 Natural Gas Pipeline Safety

The transportation of natural gas involves inherent risk from the potential failure of the pipeline due to corrosion, installation problems, physical deformation, substrate movement or material wear. Pipeline operations are relatively safe and accidental releases are rare. There is a minor potential risk for explosion, fire or significant release of natural gas into the atmosphere.

Natural gas consumption in the U.S. has increased 21 percent since 1988 yet the number of injuries associated with pipeline accidents has declined 39 percent in the same period. This result has been attributed to better construction techniques, stricter safety precautions and stronger training programs. **Table 3.11-1** represents the risk probabilities for natural gas pipelines:

Table 3.11-1
Risk Probabilities for Natural Gas Pipelines
Average Probabilities Per Year (USDOT data – 1986 to 2002)

Event probability per mile year	0.00027 accidents per mile-year	0.000045 injuries per mile-year	0.000012 fatalities per mile-year
Equivalent probability	2.7 accidents: 10,000 miles-year	4.5 injuries: 100,000 miles-year	1.2 fatalities: 100,000 miles-year

The term “per mile-year” is equivalent to “each mile, each year." For example, there would be an estimated 0.00027 accidents along any particular mile of pipe within a given year.

The majority of accidents involving natural gas pipelines are caused by damage from outside forces, primarily third-party damage and earth movement. Third-party damage is responsible for almost 50 percent of all reportable accidents on natural gas pipelines. Earth movements such as subsidence, frost heave, and landslides account for almost 3 percent of accidents.

3.11.1.3 Transmission Line Safety

Currently, there are several transmission lines in the vicinity of the proposed project that are associated with the McNary substation. The Lower Monumental-McNary No. 1 Line runs east and west and then turns north for approximately 1 mile before entering the substation. This north-south corridor also includes several other transmission lines including an existing DC line (see **Figure 2.3-7**). There are seven residences and buildings within four hundred feet of the existing transmission lines. The BPA McNary-John Day Transmission Project (BPA 2002) identified a number of environmental impacts and mitigation measures for the upgrade of the substation and associated transmission facilities. Part of the transmission route for the proposed project would utilize double-circuit structures that would be constructed with single-circuit lines; this would allow for future transmission capacity.

Transmission lines produce electric and magnetic fields whose strengths depend on line design and distance from the line. Field strengths diminish rapidly with distance from the line. There are no national guidelines or standards for electric fields from transmission lines except for the 5-milliampere criterion for maximum permissible shock current from vehicles. Oregon also has a 9-kV/m limit on the maximum field under transmission lines. BPA designs new transmission lines to meet the 9-kV/m maximum on the transmission ROW and 5-kV/m maximum at the edge of the

ROW. Transmission lines can be a major source of magnetic field exposure for residences located close by. There are no national guidelines or standards for magnetic field exposure.

3.11.2 Environmental Consequences and Mitigation

3.11.2.1 Power Plant

The Wanapa Energy Center would be fueled by natural gas, which is delivered by pipeline. No natural gas would be stored on the plant site, and the flow of gas would be monitored by pressure and flow sensors. The natural gas supply to the plant would be automatically shut down by block valves in the event of a natural gas release. No gaseous hazardous chemicals in large volumes are stored at the plant, and therefore, chemical releases that could travel outside the plant buildings or fenced area are not expected. The plant would be equipped with internal fire fighting capabilities (water, personnel), and response times from the nearest emergency response forces (Hermiston Fire Department) is 10 minutes or less.

As discussed above, the Wanapa Energy Center is buffered by more than a mile in all directions from inhabited structures, or public roadways.

In summary, the potential for power plant accidents resulting in fires or releases is very low, based on the internal operational controls. The potential for injury to the public is also very low because the plant is isolated from the nearest occupied structures by more than 1 mile.

3.11.2.2 Natural Gas Pipeline

The gas pipeline would be constructed along a 10-mile corridor from the Northwest Stanfield Compressor Station to the proposed facility. The land use in the construction corridor consists of mixed use and includes agricultural, residential and vacant land.

During construction and operation of the pipeline, there are several potential impacts to public health and safety.

Gas Pipeline Construction Safety Risks

During construction and installation of the pipeline, there is potential for fire and injury due to use of heavy equipment, working in trenches and working with large material components. Directional drilling also would be utilized in certain locations to minimize surface disturbance. There also are potential safety issues associated with increased traffic on access roads and the movement of heavy equipment to the construction corridor.

Contractors that conduct construction activities would be required to develop and implement health and safety plans that address all on-site activities. These plans would include specific procedures for safely conducting any activity with significant safety risks. All contractor employees would receive initial health and safety training before starting work and periodic training updates throughout the project. Emergency response and first aid procedures also would be established and all employees would be trained on their implementation. At the end of every workday, the contractors would secure all construction areas to protect equipment, materials and the public. Fueling of highway authorized vehicles would be conducted off-site. Fueling of construction vehicles would be conducted according to established procedures that minimize fire risks. Only trained personnel would be permitted to conduct high-risk operations such as directional drilling and all other personnel would be required to maintain a safe distance from such operations.

All construction sites would maintain firefighting equipment such as extinguishers and spill response equipment. Vegetation would be cleared from construction sites to prevent contact with fire ignition sources such as vehicles and construction equipment. All construction activities would be conducted according to applicable USDOT, Occupational Safety and Health Administration, and state regulations.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Gas Pipeline Operational Public Health and Safety Risks

As far as potential risk to environmentally sensitive areas, natural gas releases are expected to have limited adverse effects on the environment due to the physical properties of natural gas. Methane, the primary component of natural gas, is colorless, odorless and tasteless. Methane is a naturally occurring product of anaerobic fermentation and is commonly found as an emission from wetlands.

Once released, methane rapidly volatilizes (evaporates) into the atmosphere. While methane is not toxic, it is classified as a simple asphyxiant which means that if breathed in high concentrations, it can cause oxygen deficiency. Because natural gas does not bioaccumulate, is non-toxic and disperses rapidly into the atmosphere, toxicological effects to environmentally sensitive areas would not be expected.

However, natural gas does pose a physical hazard. The greatest hazard to public safety from a major pipeline rupture would be a fire or explosion. Methane has an ignition temperature of 1,000°F and is flammable at concentrations between 5 and 15 percent in air. A flammable concentration within an enclosed space in the presence of an ignition source could explode. However, unconfined mixtures of methane in air are not explosive.

To evaluate the potential hazard to the public, it was determined that there are 16 residences within 200 feet of the pipeline route. Using the risk probabilities for natural gas pipelines, the following risk values to these residences can be calculated for the life of the proposed facility:

Table 3.11-2 demonstrates that the probability of an incident involving the natural gas pipeline would be extremely low, based on historical statistics.

Table 3.11-2
Estimated Incident Rates for the Project's Natural Gas Pipeline Service Life

Service Life	Accidents (#)	Injuries (#)	Fatalities (#)
30 Years Service	0.08	0.01	0.004
50 Years Service	0.14	0.02	0.006

The gas pipeline for the proposed project would be constructed according to federal standards including the Pipeline Safety Act of 1992 and the Pipeline Safety Improvement Act of 2000. Safety specifications include minimum depth cover, pipe wall thickness, design pressures, material selection and protection from internal, external and atmospheric corrosion. There also would be requirements for inspection and testing of welds and frequency of pipeline patrols and leak surveys. Before operation, the pipeline would be tested for leaks using hydrostatic test methods. The pipeline route would be marked with aboveground signs at road crossings to deter third-party damage.

Because the 10-mile route of the gas pipeline is readily accessible, emergency response would be rapid and unhindered by terrain or weather. Subsequent repairs also would be completed quickly.

The potential hazard to public safety and the environment from pipeline failures would be extremely low.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

3.11.2.3 Transmission Line *Safety*

Transmission Line Construction Safety Risks

During construction and installation of towers and conductor/ground wires, there is potential for fire and injury due to use of heavy equipment, working at heights and working with high voltage equipment. Connection of conductors may be done using ***implosive-type fittings***, which can cause potential injury to construction workers. There also are potential safety issues associated with increased traffic on access roads and the movement of heavy equipment to the construction corridor.

Contractors that conduct construction activities would be required to develop and implement health and safety plans that address all on-site activities. These plans would include specific procedures for safely conducting any activity with significant safety risks. All contractor employees would receive initial health and safety training before starting work and periodic updates throughout the project. Emergency response and first aid procedures also would be established and all employees would be trained on their implementation. At the end of every work day, the contractors would secure all construction areas to protect equipment, materials and the public. Fueling of highway authorized vehicles and helicopters would be conducted off-site. Fueling of construction vehicles would be conducted according to established procedures that minimize fire risks. Helicopter pilots would adhere to established flight safety procedures for protecting construction workers and the general public. Notice would be provided to the public for all high-risk operations such as blasting. Only trained personnel would be permitted to conduct such high-risk operations and all other personnel would be required to maintain a safe distance from such operations.

All construction sites would maintain firefighting equipment such as extinguishers. Vegetation would be cleared from construction sites to prevent contact with transmission lines and fire ignition sources such as vehicles. Towers and lines would be constructed according to the National Electrical Safety Code and BPA procedures. BPA specifications also would be followed for grounding fences and other objects on or near the proposed ROW.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Transmission Line Operational Public Health and Safety Effects

There would be slight additional risks for fire and injuries to maintenance workers that travel in the corridor to perform maintenance on the transmission lines. Transmission lines also represent potential for electric shocks; however, the lines are constructed and operated according to the National Electrical Safety Code and BPA procedures and are designed to minimize the risk for shock. BPA offers a free booklet that describes safety precautions for individuals who live or work near transmission lines ("Living and Working Safely Around High Voltage Power Lines" – a copy can be found in the BPA McNary- John Day Transmission Project EIS (BPA 2002) or obtained directly from BPA).

All maintenance workers would receive specific training on the appropriate procedures for equipment inspection and repairs. They also would receive first aid and emergency response training with periodic refresher sessions. Maintenance vehicles would carry fire suppression equipment and communications equipment to facilitate contacting back-up emergency response personnel.

There are four operational aspects, attributed to the electrical environment of a high voltage transmission line, which are commonly addressed in new construction: 1) radio and television interference – also known as RI and TVI; 2) audible noise; 3) electric fields; and 4) magnetic fields. Often electric and magnetic fields are generically grouped and called Electromagnetic fields (EMFs). Each of these aspects is considered below.

RI and TVI. A spark-like phenomenon called corona on the surface of high voltage conductors can create signals that may interfere with radio and television reception. Modern line designs have reduced corona to a minimum and such a design would be employed. However, occasionally, more

sensitive radios and television sets pick up the “corona” noise. BPA policy is to address problems on a case-by-case basis. Some RI and TVI situations been corrected by locating and fixing a hardware problem on the transmission line, a problem typically caused during construction.

The TRCI has expressed concern about the proximity of a new high voltage transmission line to the facility because some of the frequencies used for facility communications and security could be affected. The Institution also expressed concern about interference with the reception for AM band radio stations, to which prisoners often listen. Prediction of potential transmission line corona effects on these sources would require detailed studies. As an alternative, the BPA has estimated that a distance of 1,000 feet would be sufficient to prevent interaction between the transmission line and Institution security systems and radio reception. The proposed transmission line alignment would much farther than 1,000 feet from the Institution fence line.

Audible Noise. Corona, especially during rain, is a source of low–frequency hum (120 Hz) and crackling. Modern line designs have reduced this noise to regulatory levels. The unit of measurement for audible noise is the dBA. Oregon State regulations require 50 dBA at the edge of ROW. BPA calculations show that existing levels to be approximately 52 dBA; however, the calculation methodology does have a 2 dBA uncertainty and actual measured levels are usually less.

The audible noise calculation methodology can predict the relative effect of a new line on the existing environment. Specific calculated levels at the existing edges of ROW are 52.2, 52.3, 51.0, and 50.6 dBA. For the new transmission line, the calculated results are 52.5, 52.2, 51.4, and 50.8 dBA. These differences are undetectable to the human ear. Also note that one level slightly decreased; this is because the location of the edge of that ROW changed due to the position of the new line.

Electric fields. These fields are a function of line voltage, line design, and distance between the conductors and ground. The chief effects can be nuisance shocks to humans on the ROW. Oregon State limits the level to a maximum of 9 kV/m on the ROW. Under conditions of maximum conductor sag (minimum clearance) the levels on the new ROW would not exceed that limit.

Magnetic Fields. These fields are generated by line currents that can be quite variable depending on electrical loads through the system. Thus, magnetic fields depend on the time of day and the season. There is no simple methodology to predict levels at any particular future instance in time.

However, experience has shown that peak levels are the most predictable. These peaks will occur when all involved lines have maximum currents flowing. If the new line were not built the calculated peak magnetic fields at the edges of ROW would be 18.4, 6.3, 61.1, and 61.4 milligauss (mG) - (estimated predictions for 2004). Effect of a new line would be 21.2, 74.3, 45.5, and 45.2 mG at those same locations.

The only residential areas located in the vicinity of the proposed new transmission line is the north-south 1 mile segment parallel to Highway 395 where the new transmission line would be constructed. The existing Lower Monumental–McNary circuits would be re-located on the new structures; the Wanapa–McNary transmission line would be attached to the existing Lower Monumental–McNary structures (see **Figure 2.3-8**). It was estimated from aerial photo interpretation and ground reconnaissance that 10 occupied residential structures are located adjacent to Lind Road between the existing Lower Monumental–McNary transmission line and the proposed transmission line segment (see **Figure 3.9-2**). The non-ROW area between the new transmission line and the existing Lower Monumental–McNary 500 kV transmission line varies from about 250 feet wide to 550 feet (a somewhat triangular shape). Variation of magnetic field in this area is best described in chart form. The following figures (**Figures 3.11-1** and **3.11-2**) show plots of predicted magnetic fields in the non-ROW area as well as on the ROW.

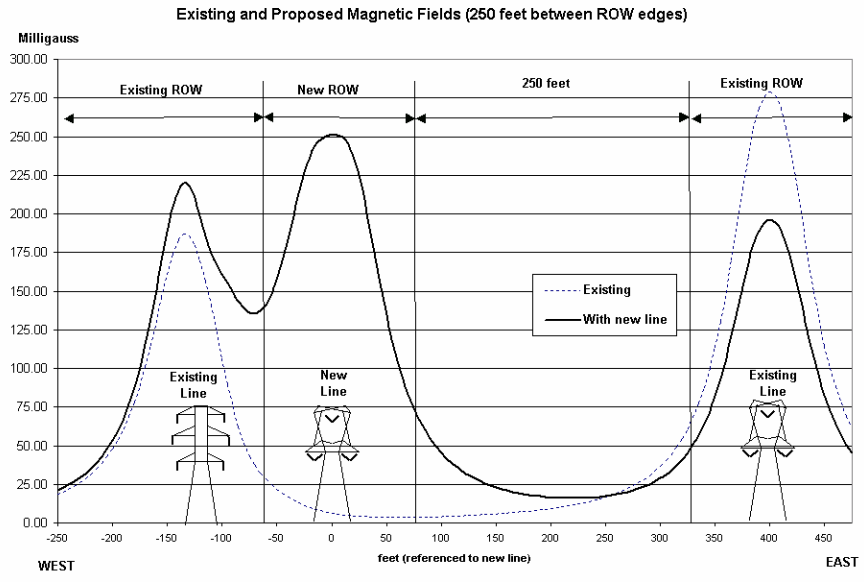

Figure 3.11-1 Existing and Proposed Magnetic Fields (250 feet between ROWs)

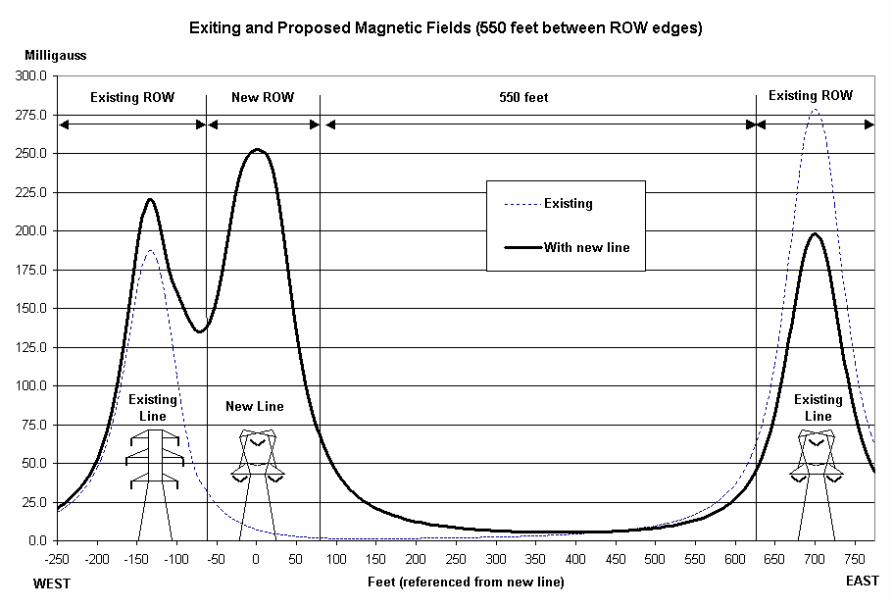

Figure 3.11-2 Existing and Proposed Magnetic Fields (500 feet between ROWs)

The net result is a reduction of the magnetic fields on the eastern one-third portion of the area between the ROW edges, as well as under the existing Lower Monumental–McNary 500 kV line. Magnetic fields would be increased in the vicinity of the new line and in the western two-thirds of the triangular area.

Residences in the area of increasing magnetic fields may have problems with TV pictures and computer monitors – the degree of disturbance depends on exact location. Liquid crystal display monitors are not affected.

Over the past two decades, much research has been completed regarding the health effects of magnetic fields. Some studies have reported increased risks for cancer; other studies were negative. The general opinion is that there is a lack of evidence supporting the health effects, and, if there are effects, they are difficult to establish. BPA has adopted the stance taken by the National Institute of Environmental Health Science (NIEHS) and advises those interested in the subject to locate the

NIEHS website and the related site called EMFRAPID. The available information is extensive. BPA suggests reviewing the summaries which essentially state the NIEHS position.

All structures, conductors and lines would be constructed according to the National Electrical Safety Code and BPA procedures – electric and magnetic fields that would be produced would not exceed standard levels of exposure for this type of transmission line and distances to receptors.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

3.11.3 Impact Summary

The potential impacts to public safety and health would be minor. During construction of the ***power plant,*** transmission line***s,*** and gas***/water*** pipeline***s***, good engineering practices and standard safety procedures would be implemented to protect construction workers and the general public. The new transmission line would be located adjacent to existing transmission lines and those residences and buildings already in close proximity to existing lines could experience a slight increase in exposure to electric and magnetic fields. Residences, buildings and people in the vicinity of the gas pipeline would be exposed to a minor risk for pipeline incidents such as leaks, fires or explosions. However, over the 30 to 50 years of expected service life of the pipeline, the projected incident rate for accidents, injuries or fatalities is 0.014 or less. The pipeline would be regularly inspected and tested according to industry standards to minimize the potential for incidents.

3.11.4 Component Alternatives Comparison Summaries

The consequence of an accidental pipeline natural gas release and fire is dependent on the number and proximity of residential and commercial structures to the pipeline. The Proposed Action would pass within 200 feet of 16 residences. Fewer residences would be located along Alternatives 1, 3, and 4 where the routes are located further away from county roads. The pipeline would pass within 200 feet of more residences along Alternatives 2, 5, and 6 (43, 42, and 44 residences, respectively) because these gas pipeline alternatives are located within county road ROWs, or cross densely settled areas. Many residences are located next to county roads because utilities (water and electrical power) are located along these roads. Gas pipelines buried in the same ROW as other buried utilities (e.g., water, telephone cable) along roads may

experience a higher risk of accidental excavation damage by third parties. Natural gas pipeline location signs would be required by utility and safety agencies.

Based on an evaluation of existing and proposed magnetic fields associated with transmission lines routed parallel to Lind Road, it is estimated that 10 residences that are located within about 300 feet from existing and proposed transmission lines would be exposed to slight increases in electrical and magnetic fields if the Proposed Action or Alternative 1 were constructed or operated. No residences would be exposed to increases in electrical and magnetic fields if Alternatives 2 or 3 were constructed because they would be installed in a new ROW with no existing transmission lines, and would be located away from residential areas.