EXHIBIT I ANTICIPATED NOISE AND INTERFERENCE WITH COMMUNICATION SIGNALS

As stated in the Arizona Corporation Commission Rules of Practice and Procedure R14-3-219:

"Describe the anticipated noise emission levels and any interference with communication signals which will emanate from the proposed facilities."

Certain electromagnetic effects are inherently associated with overhead transmission of electrical power at high voltage. These effects are produced by the electric and magnetic fields (EMF) of the transmission line, with one of the primary effects being corona discharge. Corona effects are manifest as audible noise, radio interference, and television interference. These particular effects will be minimized by line location, line design, and construction practices. Results presented in this exhibit are based on consideration of the various possible construction configurations along the transmission line route.

CORONA AND AUDIBLE NOISE

Noise emanating from a transmission line is caused by corona. Corona is the electrical ionization of the air that occurs near the surface of the energized conductor and suspension hardware, due to very high electric field strength. Corona may result in audible noise being produced by a transmission line.

The amount of corona produced by a transmission line is a function of the voltage of the line, diameter of the conductors, locations of the conductors in relation to each other, elevation of the line above sea level, condition of the conductors and hardware, and local weather conditions. Corona typically becomes a design concern for transmission lines at 345kV and above and is less noticeable from lines that are operated at lower voltages, such as this proposed 138kV transmission line.

The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface; hence, lower corona than smaller conductors, everything else being equal. The conductors for the project would be selected to have large diameters, and thus a reduced potential to create audible noise. Irregularities (such as nicks and scrapes on the conductor surface or sharp edges on suspension hardware) concentrate the electric field at these locations, increasing the electric field gradient and the resulting corona at these spots. Similarly, foreign objects on the conductor surface, such as dust or insects, can cause irregularities on the surface that are a source for corona.

Corona also increases at higher elevations where the density of the atmosphere is less than at sea level. Audible noise varies with elevation with the relationship of A/300, where A is the elevation of the line above sea level measured in meters (EPRI 2005). Audible noise at a 600-meter elevation would be twice the audible noise at 300 meters, all other things being equal.

Raindrops, snow, fog, hoarfrost, and condensation accumulated on the conductor surface are also sources of surface irregularities that can increase corona. During fair weather, the number of these condensed water droplets or ice crystals is usually small and the corona effect is also small. However, during wet weather, the number of these sources increases (e.g., due to rain drops standing on the conductor) and corona effects are therefore greater. During wet or foul weather conditions, the conductor would produce the greatest amount of corona noise; yet noise generated by heavy rain hitting the ground would typically be greater than the noise generated by corona, thus masking the audible noise from the transmission line.

Corona produced on a transmission line can be reduced by the design of the transmission line, and the selection of hardware and conductors used for the construction of the line. For instance, the use of conductor hangers that have rounded rather than sharp edges and no protruding bolts with sharp edges would reduce corona. The conductors themselves can be made with larger diameters and handled so that they have smooth surfaces without nicks, burrs, or scrapes in the conductor strands. The transmission line proposed for this project will be designed to reduce corona generation.

Some level of noise will result from transmission line construction, operation, and maintenance. During construction, equipment used for assembly and erection of structures, wire pulling and splicing, and rehabilitation activities will generate noise. Noise from construction activities would be audible, particularly, to the closest residents. This construction noise, however, would not be considered a major impact because construction would occur during daytime hours when tolerance to noise is higher, and would be temporary lasting only a few days at a time in any one location. Long-term noise impacts from transmission line operation and maintenance activities are expected to be minimal.

RADIO INTERFERENCE

Corona-generated radio interference is most likely to affect the amplitude modulation (AM) radio broadcast band (535 to 1,605 kilohertz); frequency modulation (FM) radio is rarely affected. Only AM receivers that are tuned to a weak station and are located very near to transmission lines have the potential to be affected by radio interference. An example is the humming noise on an AM radio that happens when the radio is near a power line, but diminishes as the radio moves away from the line. There should be little to no AM radio interference from any of the proposed project alternatives. FM radio is rarely affected by transmission lines. FM radio receivers usually do not pick up interference from transmission lines, because corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88 to 108 megahertz). In addition, the excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude-type disturbances. There should be little to no FM radio interference from any of the proposed project alternatives.

TELEVISION INTERFERENCE

Interference with over the air television reception from the transmission line's corona effects may occur during periods of bad weather, but is usually only a concern for transmission lines of

345kV or greater and only for receivers within 500 feet of the line. Because the nominal voltage is 138kV, television interference is not expected.

ELECTRIC AND MAGNETIC FIELD EFFECTS

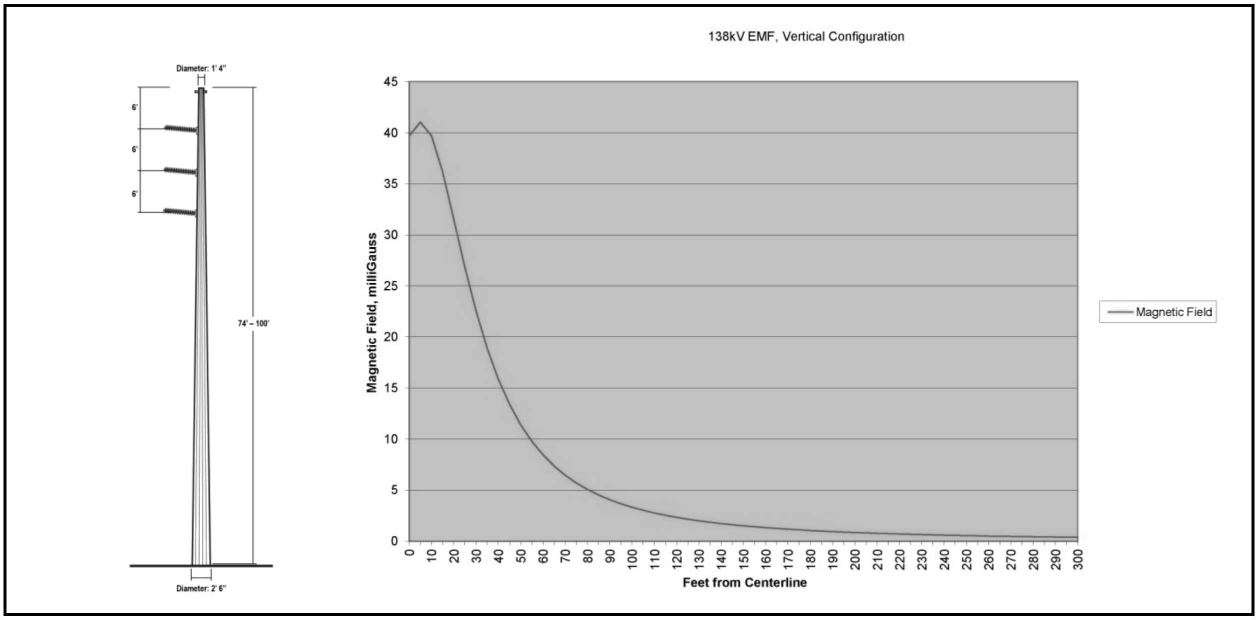
EMF are produced by power lines, and these fields would induce voltages and currents on nearby conductive objects. Electric fields are produced whenever a conductor is connected to a source of electrical voltage; for example, the plugging of a lamp into a wall outlet in a home. When the lamp is plugged in, a voltage is induced in the cord to the lamp, which causes an electric field to be created around the cord. Magnetic fields are produced whenever an electrical current flows in a conductor. In the lamp example, if the lamp is turned on (allowing electricity to flow to the lamp), a magnetic field is created around the lamp cord, in addition to the electric field. These fields exist around overhead and underground power lines, house wiring, computers, power tools, appliances, and anything that carries or uses electricity. Table I-1 demonstrates examples of EMF levels from various electrical sources.

Table I-1. EMF Strength of Various Electrical Sources at Various Distances

EMF Source [1]	Distance	Strength	Distance	Strength	Distance	Strength
Microwave Oven	0.5 ft	200 mG	1.0 ft	4 mG	4.0 ft	2 mG
Vacuum Cleaner	0.5 ft	300 mG	1.0 ft	60 mG	4.0 ft	1 mG
Hair Dryer	0.5 ft	300 mG	1.0 ft	1 mG	4.0 ft	0 mG
Electric Shaver	0.5 ft	100 mG	1.0 ft	20 mG	4.0 ft	0 mG
138kV Transmission Line, vertical [2]	0 ft	40 mG	50 ft	11 mG	300 ft	0.4 mG

[1] Appliance magnetic field strengths are median values in milliGauss (mG) for typical 60 Hz electrical current (source: USNIEHS 1999; Department of Energy 1995)
[2] 138kV power line ROW is 100 feet wide; 0-foot values represent directly below the lines at lowest point of sag

Both current and voltage are required to transmit electrical energy over a transmission line. The current, a flow of electrical charge, measured in amperes, creates a magnetic field. This can fluctuate with the amount of line loading at any given time. The voltage (force or pressure that causes the current to flow), measured in units of volts or thousand volts, creates an electric field. Though an electric field is present anytime a line is energized, even from one end, the magnetic field exists only when electricity flows. It is general practice to consider both fields together as EMF values in assessing the amount of effect at the outer edge of a transmission line's ROW. EMF decreases in strength with increased distance from the source. In addition, electric fields are further weakened by obstacles such as walls, roofs, trees, and vegetation. However, magnetic fields are not easily shielded by most materials and are primarily reduced in strength by distance alone. The EMF values associated with this project are expected to be comparable to other 138kV transmission lines in the state and are expected to be within generally accepted standards at the edge of the proposed ROW.



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