# KARB Transmission System

## Transmitter Power Output Calculations

This exhibit has been included to explain the basis for the transmitter power output utilized to achieve the authorized effective radiated power of 7.0 kW. The antenna system consists of a circularly polarized Jampro JMPC-3 antenna. The antenna has a power gain of 1.5 at 98.3 mHz. Therefore, an antenna input power of 4667 watts is required to achieve 7.0 kW.

To get the signal from the transmitter to the antenna, it must pass through 41 meters of Andrew HJ7-50 transmission line (.31 dB loss) yielding an efficiency of 93.18%. Therefore, a power of 5008 watts is required at the transmitter output to achieve the authorized effective radiated power. After rounding, a transmitter power output of 5 kilowatts is needed to achieve the permitted ERP.

**Feed System Efficiency:**

In calculating the Feed System Efficiency, the following values were used based on the insertion loss data provided by each manufacturer.

Andrew HJ7-50 Heliax (41 meters)
Insertion Loss = 0.31 dB (at 98.3 MHz)

**Antenna Gain:**

In calculating the Antenna Gain, the following value was used based on data provided by the manufacturer:
Jampro JMPC-3
Power Gain: 1.5 (Circularly Polarized)

**TPO Calculations:**

$$\frac{\text{Effective Radiated Power}}{(\text{Antenna Power Gain} * \text{Feed System Efficiency})} = \text{TPO}$$

$$\frac{7\text{ kW}}{(1.5 * 93.18\%)} = \mathbf{5.008\text{ kW} = 5\text{ kW TPO}}$$