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ELECTROMAGNETIC FIELD MEASUREMENTS
AT OREM UTAH FM TRANSMITTER SITE

ALPINE SCHOOL DISTRICT OREM HIGH SCHOOL

KOHS, 91.7 MHz

OREM, UTAH

MAY 2016

INTRODUCTION

Hatfield & Dawson was retained to measure the radiofrequency power density around the FM transmitting facility used by KOHS. This site is located in the foothills east of Orem, Utah.

In May 2016 KOHS changed its power level and installed a directional antenna directing the power towards the west. The power changed from 1.75 kW to 1.0 kW. This modification was made in order to accommodate changes made to other FM stations. The radiofrequency power density measurements were made between the hours of 9:00 AM and 10:00 AM on 9 May 2016. Measurements were made by Stephen S. Lockwood, P.E. All broadcast transmitters at the site were reportedly operating at 100% of licensed power as the measurements were made.

SITE ACCESS AND LOCATION

The transmitter site is located east along a ridge 250 feet above the East Lawn Memorial Hills Cemetery. This site is not accessible to the public. There is a locking gate to the access road to the site. This gate is posted with “No Trespassing” and RF Exposure caution signs.

MEASUREMENT PROCEDURES

Measurement procedures outlined in **OET BULLETIN 65, (EDITION 97-01)**, [OET 65] “**Evaluating Compliance With FCC-Specified Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields**”, **ANSI/IEEE Std C95.3-1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields--RF and Microwave**, and **NCRP Report No. 119, “A Practical Guide to the Determination of Human Exposure to Radiofrequency Fields”** were used for the measurements taken at the KOHS site. Spatially averaged measurements were made at the points where the highest fields were found.

According to the ANSI C95.3 guidelines (reaffirmed in OET 65) measurements to determine exposure compliance are to be made at distances 20 cm or greater from any object. This is to assure that the measurements are not contaminated by re-radiation from conductive objects.

TEST EQUIPMENT USED

A NARDA Model 8718B Electromagnetic Radiation Survey Meter with a NARDA Model B8742 Isotropic Shaped Electric Field Probe was used to make the measurements. The NARDA B8742 probe provides an output proportional to **CFR 47 §1.1310 Radiofrequency Radiation Exposure Limits** (Occupational/Controlled Environments) maximum permissible exposure (MPE) over a frequency range from 300 kHz to 3 GHz. The isotropic response of the NARDA B8742 probe is +/-0.75dB.

The NARDA Model 8718B Electromagnetic Radiation Survey Meter allows for accurate and repeatable spatially averaged measurements through the use of its time averaging feature. A single key stroke implements the meter's time averaging function as the probe is swept through an area that approximates that of the human body. Spatial Point fields are also stored by the meter during the spatially averaged measurement.

The NARDA diode probes, such as the Model 8742, are designed to provide signal detection on a square law basis and yields accurate readings of fields from multiple sources. Other available measurement devices, such as those manufactured by Holaday and Wandel & Golterman, use linear detection and square the signals after adding. If there are two signals of roughly equal intensity, $E_1 + E_2$ the desired summation is $(E_1)^2 + (E_2)^2$. The result obtained by squaring the signals after addition is $(E_1)^2 + (E_1)(E_2) + (E_2)^2$. The $(E_1)(E_2)$ term results in a measurement error. For this reason the most accurate measurements of RF fields using diode detection are provided by use of probes such as the NARDA 8742D probe that utilize square law detection. Diode probe errors are also discussed in "*Multiple-Source, Multiple Frequency Error of an Electric Field Meter*" (Randa and Kanda).

Item	Make/Model	Serial Number	Calibration Date
RF Survey Meter	Narda 8718B	1194	
Isotropic Shaped Electrical Field Probe (IEEE/ANSI Public Environments): 300 kHz-3 GHz	Narda B8742D	05003	October 2015

MEASURED FIELDS

These measurements found that there are no locations at the site that exceed the FCC General Population / Uncontrolled Environment MPE. The highest field that was encountered on the site was 12.5% of the General Population/Uncontrolled Environment MPE. This location was at the access gate to the site. All other areas at the site are below the FCC General Population/Uncontrolled Environment MPE.

STATEMENT OF ENGINEER

This Engineering Report regarding radiofrequency field measurements around the KOHS FM a transmitter site located east of Orem, Utah, has been prepared by the undersigned or under my direct supervision. All representations contained herein are true to the best of my knowledge. I am an experienced radio engineer whose qualifications are a matter of record with the Federal Communications Commission. I am a partner in the firm of Hatfield and Dawson Consulting Engineers and am Registered as a Professional Engineer in the States of Washington, Alaska, and Wyoming.

Stephen S. Lockwood, P.E.

10 May 2016

