

Summary EM Measurements of a Swiss Civil Defense Facility

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In June of 2003, an electromagnetic (EM) field test was conducted at a Swiss Civil Defense facility located in the village of Gurmels, Switzerland. This test was designed to assess the EM shielding provided by this facility at frequencies above 100 MHz, which are typical of newly emerging high power electromagnetic (HP EM) field threats to military and civilian systems. Such testing and results are pertinent to an ongoing MURI program (U.S. DoD MURI grant F49620-01-1-0436 with University of Illinois at Chicago and other participating universities).

The measurements performed in this test were for the frequency domain transfer functions relating the voltage exciting a wide band antenna (the Swiss impulse radiating antenna (IRA)) to the internal magnetic (H) field in the facility or the induced current on internal conductors. For these measurements, several different antenna locations were used.

After the testing was concluded, the measured data were analyzed and frequency dependent cumulative probability distributions (CPDs) were developed to illustrate the distribution of the internal responses. This provides information about the probability of finding a particular response level at each frequency.

In addition, the measured frequency domain responses were converted into the time domain using standard Fourier transformation techniques. In doing this, the effective pulsed excitation waveform driving the IRA was taken to be a 3 KV pulse. This pulse is similar in shape to the output of an actual pulser that has been used in other facility tests in conducted in Switzerland and described in the literature (Tesche, F. M., et. al., "Measurements of High-Power Electromagnetic Field Interaction with a Buried Facility", Proceedings of the International Conference on Electromagnetics in Advanced Applications, Torino, Italy, September 10-14, 2001).

This paper describes the Civil Defense facility that was tested, reviews the test method and illustrates some typical results that were obtained. It also summarizes a number of observations about the behavior of the internal H-field and current responses in the facility. In addition, a simple analytical model for the H-field shielding of the facility is suggested.

