AEGIS

WHITE PAPER:

ELECTROSHOCK WEAPONS (ESWs) AND PUBLIC SAFETY: THE NEED FOR STANDARDIZED AND REGULAR MEASUREMENT

DEFEND. PROTECT. PRESERVE.

PROBLEM:

Electroshock weapons (ESWs) are deployed by military/law enforcement (M/LE) agencies throughout the world yet there are no standards for safety, performance or reliability for these "less lethal" weapons. The lack of government oversight, regulations, or industry standards for ESWs is disturbing considering that government and manufacturers have acknowledged these weapons can cause cardiac rhythm capture and other deleterious effects that can lead to unintended consequences, including death. Manufacturers and independent laboratories have also divulged in published reports and disclosures that the electrical energy discharged by ESWs can be outside manufacturer specifications. As a result, public and officer safety can be compromised, and there is no way to ensure that ESWs are operating safely, properly, or reliably, either prior to use or after an injury or death has occurred. In addition, there is no currently existing methodology to hold ESW manufacturers accountable for the electrical energy discharged during the entire life cycle of theses weapons.

AEGIS AXEOS™

SOLUTION:

Stakeholders inside and outside of the industry, the National Institute of Standards & Technology, Law Enforcement Standards Office (NIST OLES) and the International Electrotechnical Commission (IEC) have all identified the need for, and participated in, the development and recommendation of a standardized measurement method for ESWs. In response to this emerging need, an ESW waveform analyzer has been developed for M/LE agencies that will quickly and accurately determine that ESWs are operating properly, reliably, and within a manufacturer's specifications prior to use. The AEGIS AXEOS ESW Waveform Analyzer allows agencies to discharge, display, record, store, and even transfer complete ESW discharge data for verification, characterization, evidentiary, and technology trend purposes.

BACKGROUND

Electroshock weapons (ESWs) are "less-lethal" weapons used to introduce electrical insult into a human body for the purpose of creating pain and incapacitation in non-deadly scenarios. In 1999, the National Institute of Justice, Office of Science & Technology (NIJ, OS&T) published The Sticky Shocker Report, a comprehensive report that determined adverse, irreversible, and unintended consequences, including death, could occur as a result of ESWs introducing electrical insult into the body.

This report identified that, overall, there was not enough relevant heart current data available to predict cardiac effects of ESWs, and that it was unclear how electrical currents actually affect the human body. In addition, this report determined that pH levels of the blood change drastically when electrical current passes through the body, which could easily affect the respiratory system of the heart and result in death. This report also identified the need to develop a standardized means to measure and predict the electrical energy discharged by ESWs.

Another government report in 2003 recognized that the physiological effects of ESWs are temporal and would not leave pathological markers such as gunshot wounds. As a result, this report questioned

"So we really didn't come up with a good way to measure the peak of the voltage." – *Max Nerheim, VP Research & Development, Oct. 2009*

how coroners and medical examiners could exclude identifying ESW usage as a causal or contributory factor proximal to deaths.

No independent risk characterizations were conducted to validate the claims made by manufacturers that minimized the risks associated with high power ESW technology. Meanwhile, increased deaths and additional independent scientific research actually demonstrated that ESWs were not as safe as originally claimed. Manufacturers eventually changed the recommended target areas and acknowledged that known and possible side effects of ESWs include cardiac capture, which could lead to death. In 2007, a high profile death related to ESW use resulted in the Braidwood Inquiry. One of the recommendations from this Inquiry was for ESW policies to include the measurement of electrical energy discharged by these weapons to ensure their safe and proper operation, performance, and reliability.

When ESWs started to be measured in 2008, and a significant number were found to be operating outside the manufacturer's own specifications. Consequently, the manufacturer changed the recommended measurement protocol for ESWs several times during this period.

As a result, questions soon surfaced within the scientific, engineering, law enforcement, legal, and insurance industries regarding the independence, accuracy, and legitimacy of the measurement methods used by manufacturers, medical examiners, and others to measure the actual amount of electrical current being discharged by ESWs.

NIST (OLES)

In 2008, the National Institute of Standards and Technology, Law Enforcement Standards Office (NIST, OLES) initiated a program of development for rigorous performance requirements for ESWs. This included the measurement of current and high- voltage output of these weapons, calibration of these measurement methods, and computing measurement uncertainties. During a 2009 meeting, one senior electrical engineer from one prominent ESW manufacturer actually admitted that, "We really have not come up with a good way to measure the high voltage." This was quite disturbing, given that this same engineer had recommended numerous measurement protocols to independent entities testing ESWs before, during and after this time.

The IEC is the international authority recognized for developing standards for any product that produces, utilizes, stores or transfers electrical power. In 2012, the IEC developed the PT 62792: ESW Measurement Method. This standard was developed to become the internationally recognized and accepted method for the safe, accurate, and reliable measurement of ESWs.

The IEC PT 62792 will provide manufacturers of ESWs and all stakeholders, from researchers, laboratories, M/LE agencies, industry associations and organizations, insurance providers, city and risk managers, and many others with the guidance to independently and accurately measure ESWs for electrical energy discharged, proper operation, performance and reliability.

AEGIS AXEOS™

AEGIS has designed and patented the AXEOS™ ESW Waveform Analyzer, a bench top measurement tool that quickly, safely, accurately, and cost-effectively allows M/LE agencies to discharge, display, record, store, and transfer all information related to ESW

"Inconsistent reports regarding the output of ESWs and the absence of standardized assessments . . . prevent the development of rules of deployment guidelines." – *NIST OLES*

current data.

The AXEOS™ increases public and officer safety by ensuring that ESWs are operating within manufacturers' specifications, and recording this data for evidentiary and technology trend purposes. The AXEOS™ allows M/LE agencies to take a proactive approach to mitigate litigation related to ESWs injuries and deaths. The AXEOS™ is an integral part of any agency's ESW Measurement Management program.

The usual method for ESW measurement requires $45,000.00 worth of equipment and is a tedious, time-consuming operation required to be performed by an electrical engineer. ESWs typically need to be sent to an outside testing facility and are out of service for weeks at a time. By contrast, the AXEOS™ eliminates the need to calibrate probes and other electrical equipment, manually change resistors, record data, or remove ESWs from service use.

The AEGIS AXEOS™ can completely capture, compute, verify and characterize each waveform delivered from a 5-second ESW discharge in a matter of just 20 seconds. This process includes the auto scan of serial numbers, the badge number of operator, date, time, temperature, and location of testing. The AEGIS AXEOS™ is able to test current and future professional-grade ESWs and provides M/LE agencies, as well as medical examiners and coroners, with the flexibility to conduct a myriad of tests, including the IEC PT 62972.

"ESWs should not be deployed by M/LE agencies without the ability to accurately measure the electrical energy discharged by these weapons."

– Ken Stethem, CEO AEGIS, January 2013

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