Welcome to

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Industry News

Department of Homeland Security Contracts with AMETEK for Prototypes of Advanced Portal Monitor System

Two Systems for Identifying Illicit Nuclear Materials Set for Delivery This Summer

The U.S. Department of Homeland Security has extended its contract with the ORTEC business unit of AMETEK Advanced Measurement Technology to include the fast-track development and delivery during the third quarter of 2005 of two prototypes and other related hardware for an Advanced Spectroscopic Portal Monitoring System.

The $3.1 million contract extension follows a first-stage contract awarded by the Homeland Security Advanced Research Projects Agency (HSARPA) in January to AMETEK to develop the system, which will screen passengers and cargo for potentially harmful shipments of radioactive

materials that could be used in a nuclear device or "dirty bomb."

The prototype systems will incorporate arrays of ORTEC high-purity germanium detectors coupled with several unique and novel techniques to process and present data collected from possible gamma and neutron radiation emanating from pedestrians, vehicles, or freight containers. The systems will be able to quickly determine whether or not a source is "innocent," such as naturally occurring radioactive materials and medical isotopes, or "suspicious" and poses a potential terrorist threat to safety or security.

The ORTEC technology represents a substantial advance in system performance and greatly improves the ability of authorities to resolve alarms without interfering with the normal flow of commerce at airports, border crossings, freight ports, transportation terminals, and other points of interest to the Department of Homeland Security.

ORTEC has more than 40 years of experience in the design and manufacture of highly sensitive radiation detectors used by government and industrial laboratories, nuclear facilities and medical research and in nuclear safeguards.

AMETEK Advanced Measurement Technology is a division of AMATEK, Inc. (NYSE-listed, ticker symbol: AME) a global manufacturer of electronic instruments and electric motors with annual sales of $1.3 billion.

***Editor's Note**: Industry News is printed without charge, on a space-available basis. Color photos are encouraged. To include your news in these pages, email information to publish@radpro.com.*

Letter to the Editor

Concepts and Simple Rules of Thumb, Not Intensity Limits and Alarms, Are Needed in Training Responders

Dear Editors:

It is with considerable trepidation that I write my disappointment, but not bitterness, with the insufficient response of the Health Physics Society (HPS) to the opportunities for urgent public interaction and service in the wake of September 11, 2001. Although some have heard my concerns, and an elite minority of health physicists (HPs) are participating in proper training, response, and public education, I wish that the Society as a whole would urgently take a more active role in homeland security. I have also begun to understand why it is difficult for most HPs today to realize the differences between criteria for controlling radiation exposure under peacetime conditions and criteria for reacting to radiation emergencies or terrorist events. Anyone under retirement age today was not active in recoveries at atmospheric nuclear tests, nor in the era of nuclear fuel development and reprocessing when radiation accident cases with high contamination levels required rapid actions and decisions by HPs. That is why I would like to call more attention to lessons and materials in the 2004 Summer School text (Brodsky et al. 2004), and the still urgent need for their application.

My concerns focus mainly on three issues:

1) The need to distinguish between the instruments and measurements needed for interdiction, and those needed by early responders to understand levels of radiation intensity for making on-the-spot decisions under a wide range of scenarios and orders of magnitude of radiation intensity. Current training that I have observed today is setting up responders and the public for panic rather than rapid actions that can save life and maintain the resolve to survive individually and as a nation.

2) The need to provide all families and members of the public with inexpensive personal dosimeters that will show most of them the negligible risks they face and alert the very few to possible needs for immediate protective measures. Much experience with fallout from nuclear tests has shown the very wide areas where mR-per-hour levels are obtained that would throw Geiger-Mueller counters off scale,

but the very small areas in which lethal exposure would result for stays of more than hours. Dosimeters for the public can be available, and purchased either by governments or by individuals at reasonable prices in large quantity, if we can just excite the political will to establish the programs. In the earlier civil defense programs, millions of survey instruments, and millions of dosimeters, were purchased, often at costs of $10 apiece or under (Stangler 2004, 2005). Modern dosimeters could be available in even much larger quantities. The availability of such dosimeters to the public would invoke curiosity, and would provide an opportunity to inform a more interested public about radiation levels and risks.

3) The HPS needs a more aggressive and organized program from the top down to organize and guide all of the chapters to have expanded and active public information and homeland security programs that interact with all segments of society – the public, the local responders, the media, the government agencies, and other professional societies (Brodsky 2005).

In order to keep this letter within reasonable limits, I cite references that explain my concerns and provide information for activating expanded chapter and member participation in public protection. The 2004 Summer School text (Brodsky et al. 2004) contains rationale and content for training responding teams to independently evaluate radiation intensities over a wide range of magnitudes in order to make rapid decisions in the early "golden minutes" after an attack. Also, for most members of the public, not even local responder teams will be present within the "golden minute" when decisions for appropriate action are vital. There could not even be enough HPs or emergency EMTs present within the "golden hour" (Goans 2004, 2005) that surgeons deem critical to save lives of the severely traumatized, or to adequately advise members of the public and prevent panic and disruption of the too-few local medical institutions available. No HPs or government officials will be present in the early hours to enforce limits on responders trained to take major risks to save life. Davis (2004) has pointed out, in describing requirements for citizen response, that, "Citizens need to act very quickly in chemical, radiological, nuclear attacks – emergency responders will not arrive in time to provide guidance." Moreover, each emergency team must have at least one member trained in advance (Brodsky 2004a, pp. 203-207) to measure and rapidly convert radiation exposure rates to estimated doses and risks. It is not "rocket science." Marlow Stangler and I are two former civil defenders who have trained many responders in both high and low intensity radiation fields; Marlow has been training for 50 years and has trained thousands.

I have just a few serious problems with the otherwise excellent review of considerations in NCRP Report No. 138 (NCRP 2001; Poston and Hamilton 2004); however, these problems, to me, are serious enough to wish the report had not been published in its present form. I hope that the committee currently considering revisions will read this letter. My problems pertain mainly to the statements on page 98 of the report and the resulting development of, and training with, instruments that alarm at very low and at higher fixed "turn around" intensities. I have attended training sessions where responders have been told to be concerned about 0.02 $mSv\text{-}h^{-1}$ (about 2 $mR\text{-}h^{-1}$), invoking ALARA to be below the 0.1 $mSv\text{-}h^{-1}$ (about 10 $mR\text{-}h^{-1}$) level recommended in NCRP 138 as a "suitable initial alarm level." Also, courses sponsored by the Department of Homeland Security, after showing slides of serious tissue damage from radiation, teach responders at be alerted by so-called "pagers" reading several times background. As I have mentioned to the limited audiences in recent courses and lectures, I jumped from a helicopter into ONE MILLION TIMES this intensity (about 300 $mSv\text{-}h^{-1}$, or 30,000 $mR\text{-}h^{-1}$) to recover my fission track neutron spectrometers after the 15 and 11 megaton hydrogen detonations of Operation CASTLE. I received an average "whole body" dose of only 0.025 Sv (2.5 rem) and over 10 times that dose to my lower legs from booties contaminated at a level of about 10 R per hour at a few inches; I was holding on for dear life and could not remove the booties during a 20-minute helicopter ride back to the aircraft carrier. (My film badge reading was recently corroborated by finding in the records that my colleague on the same recovery mission had within about 2 percent of the same badge reading.) I would readily accept at least ten times this dose to save ten lives by lowering from a helicopter to remove injured persons from harm (and so would any responder). The intensity level that I entered for about 5 minutes for recovering a scattered group of instruments is also higher than the "turn around" level recommended on page 98 of NCRP 138. Over so many orders of magnitude of potential dose rates, each responder or his team supervisor will need to consider the dose to be received, not the dose rate, when balancing the time required for an action against doses to be received and the importance of the mission.

Patients managed in a major hospital with millions of alpha dpm per 100 cm^2 of skin, without significant resulting contamination of hospital staff, would have thrown sensitive detectors beyond the NCRP initial alarm level, even though these patients suffered no ill effects during times of follow-up and probably no longer-term effects (Brodsky and Wald 2004). Training for response to such fixed levels will only result in panic and ineffective responses. Marlow Stangler and I found it easy to train responders from around the nation, in fallout fields from nuclear detonations, to understand the relative risks of the higher dose ranges and to make on-the-spot decisions from the readings of their meters. Counters with audible clicks or indications should be used without fixed alarm levels or limits, and must also be supplemented with higher range ion chambers and self-reading pocket chambers. It is unfortunate that lessons learned from early civil defense research and training programs have been generally lost on the present generations of HPs.

Another concern that I have is that again this NCRP report has missed or ignored my literature review of biological effects and the analysis resulting in the approximate rule of thumb for exposure in a passing fission product cloud that: 1 Ci-s-m^{-3} is roughly (within about a factor of two) equivalent in non-stochastic risks to an external exposure of 0.25 Sv (25 rem) for mixed gross fission products of various irradiation times (including nuclear detonations) and less than 30 days decay (Brodsky et al. 2001). This latter paper confirms an earlier evaluation (Brodsky 1965), and also shows that, for either set of ICRP 30 or ICRP 60 weighting factors, the long-term stochastic effects of a 1 Ci-s-m^{-3} exposure are on the same order of magnitude of cancer risk as a 0.25 Sv external gamma dose (Brodsky 1996). The earlier paper showed that the courageous estimates of Cowan and Kuper (1958), made in the early period before much Hiroshima-Nagasaki population data other human accident data were in the literature, suggested a cloud exposure equivalent to 0.25 Sv that would likely have mislead responders to receive serious non-stochastic effects at the presumed acceptable exposure levels. That is why I published my 1965 paper – in order to provide safer estimates of "acceptable emergency doses" from submersion in airborne concentrations of radioactivity. Nevertheless, to my knowledge the NCRP has never re-examined nor revoked its use of the Cowan-Kuper estimates in its earlier emergency recommendations regarding cloud exposure (NCRP 1962). I hope that the Poston committee will also seriously consider this issue. While my estimates are more "conservative" than Cowan and Kuper's, it is still clear that if much less than 600 million dpm are detected on a handkerchief when held over the mouth or other respiratory protection against inhalation during exposure in gross fission product (or most other RDD nuclide) clouds, a member of the public can be assured that serious health effects are unlikely (Brodsky 2004 a, b).

My concerns about issue 3) above, the need and ways for the HPS Board of Directors to provide urgent direction to chapters to organize member participation in homeland security training and response, are expressed in the "Hart Model" paper (Brodsky 2005). Despite my recognition of some of the good work reported at the recent midyear meeting, I am still extremely disappointed that our Society has not adequately risen to the occasion. Some of our major chapters have still been asleep on this issue. This is so despite the "9/11" experience and the daily warnings of those-in-the-know about nuclear weapons and radioactive materials available around the world to terrorists; many terrorists are known to have already infiltrated throughout our nation. The materials for use in expanded member activity are contained in the summer school text and in NCRP 138. Members should not need long periods of training in order to go out and meet the public immediately. As the William G. Morgan plenary lecturer, Dr. Peter Zimmerman, stated at the midyear meeting, health physicists are on the front lines. I have long believed that the members of our society are those best trained to meet the needs described above. They do not need to digest all of the material in the references given before starting to meet the public. By getting out and meeting with the public, any HP will soon find his skills responding to the experiences.

Why are we so slow in waking up to the needs? Two reasons have recently occurred to me: 1) the lack of experience with high levels of radiation and radioactivity in the current generations of health physicist; and 2) the paradigms of peacetime health physics that specific alarms and action levels are needed in routine radiation protection management. The first reason has been implied above but might well be the subject of another letter. The second reason occurs to me to have resulted from early peacetime regulatory paradigms. When I was preparing the 1961 edition of 10 CFR Part 20, although NCRP recommended only an annual limit to exposures, AEC lawyers and managers instructed me

that the "2 mR in any one hour" and the "100 mR in any 7 consecutive days" were necessary for proper regulatory management and inspection of licensee activities. These provisions were also deemed reasonable and not too restrictive at the time for the beneficial peacetime applications of nuclear power and associated technologies (hormesis notwithstanding and not considered in those days). However, intensity levels should not be presented as limits or cause alarms when a responder by himself or with a small team needs to balance the immediate benefits of an action against the immediate risks under specific emergency or terrorist attack conditions.

Disclaimer

This letter is derived from experiences obtained recently as a volunteer or during previous periods of employment. Opinions presented are the author's alone, are not related to the author's current employment, and do not necessarily represent the opinions of any employer or associate.

Allen Brodsky
Berlin, Maryland

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