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Nuclear cameras, isotopic identifiers and retrospective thermometers currently in your bathroom, kitchen and office (and yes, pretty much everywhere, past, present and future whether you know it or not)

Statement of the Problem: One of the key issues in nuclear nonproliferation is either verifying that someone is doing what they say they are doing or finding out if they are doing something other than what they should be doing. This can take place by measuring facility effluent to reconstruct credible work scope required to generate all the chemical and radiological signatures in a waste stream. Another method to determine nuclear activity is to actually measure the nuclear material directly. Within the past few decades, gamma ray cameras have become commercially available and they are substantially improving in technology and capability. Imaging nuclear material has historically been accomplished with pin-hole aperture gamma ray spectrometers but the more modern systems use coded apertures or Compton scatter imaging spectrometers (or both). Recent research has shown concerns associated with historical radiological air monitoring which throw gross doubt on many if not most measurements made from sampling low concentrations. Additional research has shown that imaging nuclear material can now be done in a ubiquitous sense at any time in history, past, present and future. The technology could be used for radiological emergency response dosimetry for triaging patients who could be expected to suffer from acute radiation syndrome or for forensics applications in situations where a dirty bomb or improvised nuclear device may be being developed or handled. The applications are limited only by ones imagination in that now there are low resolution integrating gamma ray spectrometric cameras densely covering all inhabited areas of the planet. They are even in adversary nuclear facilities, even those we don't know about. These details and more will be given in the presentation which will survey recent research coming out of the Nuclear Engineering Department at North Carolina State University

Biography

Dr. Robert B Hayes is an Associate Professor of Nuclear Engineering at North Carolina State University (the first academic nuclear engineering program on the planet). Here, he teaches the ramp course (the initial graduate course for incoming graduate students who do not have an undergraduate degree in nuclear engineering) along with the senior design course for students finishing their last year of undergraduate studies. His research focuses on nuclear nonproliferation using air monitoring and radiological assay, electron paramagnetic resonance, thermoluminescence and optically stimulated luminescence. He is also a Certified Health Physicist, a licensed Professional Engineer in Nuclear Engineering and a Fellow of the American Physical Society. His previous appointments included federal radiological emergency response along with all things nuclear at the Waste Isolation Pilot Plant where among other things he did the consequence assessment for the recent dirty bomb like event they had due to a shipment received from Los Alamos.

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