Pat Nelson looks at radiological monitoring and finds a problem money can't solve

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Border insecurities

On a clear day at the US border in Texas, a large transport truck slowly manoeuvred its way through a radiation detection portal – one of the newest spectroscopic monitors designed to pick up even the smallest amounts of radioactive materials illegally smuggled across borders in large cargo containers. Approximately 2,500 miles away in Washington State, another transport truck crossed the US border and also slowly made its way through its respective radiation detection station. Although different radiation detection systems were employed to scan the cargo, both checkpoints alarmed to small amounts of cesium-137, a nuclear material used in industrial gauges. The offending containers were searched and the source of the cesium-137 located.

One would think job well done; the radiation detection systems worked as promised and the country is a safer place for aborting a smuggling effort. But this was not the case. Both transport trucks, despite the radiation alarms and the subsequent location of smuggled radioactive materials, were cleared by custom officials and allowed entry across the border. The reason? Counterfeit paperwork. Luckily this was just an undercover operational test of the nation's port security, but it failed badly.

The wake of the 11 September 2001 attacks upon the common ground of the United States ushered in an era of thought and paranoia as nations around the world began to realise their own vulnerability to terrorist organisations and their potential acts of violence. The subsequent wave of defensive build up of CBRNE security efforts focused mainly upon both chemical and biological attacks, given the financial damage incurred during the clean up from the anthrax letters at the Washington DC Brentwood post office facility and the build up of the antibiotic Ciprofloxacin, used to fight the effects of anthrax contamination. Once the US had spent approximately $300m making itself less vulnerable to an anthrax attack (despite only two employee deaths occurring at the Brentwood facility due to exposure) it turned its attention to a more global, real and yet evasive threat – radiological and nuclear materials.

Detecting radioactive and nuclear materials and contamination goes far beyond the boundaries of the typical dosimeters used for employees and equipment in hospitals and medical testing facilities. For example, plutonium – which has a very low molecular weight – encased in a barrier material and then placed inside a massive cargo container bound for any large sea port in the world has enough destructive force to kill hundreds of thousands of people and is extremely difficult to detect. Realising the potential threat, global ports around the world are preparing ways of ensuring all cargo containers and goods shipped globally are safe before leaving their port of origin and after entering their port of arrival.

"Terrorists and criminals use global shipping networks, and we are deploying multiple layers of advanced technology to counter their tactics," said Homeland Security Deputy Secretary Michael Jackson during a press conference. "[We require] a global nuclear detection network with shippers, carriers and foreign allies, to head off the worst possible form of attack – a nuclear or dirty bomb on our soil."

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The top 10 US ports of entry handle approximately 25 million containers per year. An approximately equal amount arrives by truck transport and 2.75 million by rail access across borders. The US ports that facilitate the largest cargo containers are located in areas around Oakland, Los Angeles and Seattle along its western seaboard; New York, Charleston, Norfolk and Savannah along the eastern seaboard and Houston along the gulf coast, and represent only 20 per cent of the world's large cargo container ports. (www.cbp.gov).

The US Department of Homeland Security (DHS) and the Department of Energy (DOE) announced the Secure Freight Initiative early in 2007, which will link six of the world's largest container ports together to create seamless monitoring and tracking of large container ships inbound to a US receiving port. This collective effort involves a broad coalition of freight carriers, terminal operations and shippers who have pledged their support at their respective ports of call. The initial six large container ports include those in Singapore, Pakistan, Honduras, the United Kingdom, Oman and Korea.

Under Secure Freight, current nuclear and radiation detection security measures will be brought up to speed at each of the participating ports. Newer, more advanced radiation detection technologies will replace old, out-dated equipment to achieve a level of parity among the ports. Integrated communication systems will link new assets with existing equipment, and data gathered from overseas scanning will be transmitted in near-real-time to the US customs and border protection agencies as the shipments make their way across the waters. Any radiation detection alarms will be handled and resolved at their local ports, while warning systems alert the other participating ports of a verified threat. New security methods will also be employed to create cohesive protocols that will empower participating ports to stall cargo container loading and shipping in the event of such alarms.

The preliminary operational testing is to begin in Pakistan and Honduras with a goal to scan 85 per cent of all containers for any nuclear or radioactive materials prior to leaving their ports bound for the US. This will be followed shortly by Singapore and Oman. By 2012, US federal law passed by former President Bush dictates that 100 per cent of all cargo arriving legally at US borders will be scanned for radiation and nuclear materials, both at their port of departure and then again at their destination port.

"As we continue our partnership with DHS and our international allies, we continue to strengthen our national security. It is through this important work at foreign ports that we improve the overall security of the global maritime shipping network and hinder terrorists from smuggling a nuclear device or dangerous material into a US port," said Thomas D'Agostino, DOE National Nuclear Security Administration acting head, in his press announcement. "By teaming up with DHS in this important effort, NNSA is helping to bring our extensive overseas nuclear security and detection expertise to strengthen a key layer of our national defense."

DHS and DOE are estimated to invest roughly $64m the Secure Freight initiative for radiation detection and communication equipment. But looking at the bigger picture, you will see the US Government Accountability Office (GAO) estimates a mere $3.1bn earmarked through the end of 2017 to equipment all rail, port and air location with radiation detection systems.

Current radiation detectors used at global cargo ports have been limited to: the personal radiation detector – a small dosimeter that sounds an alarm when radiation is detected; radiation portal monitors, which can detect radiation from nuclear devices, dirty bombs, natural sources and other radioactive isotopes; and large-scale gamma ray/X-ray imaging systems, which uses radiation to detect radiation.

The newest, and by far the sexiest, of the detection technologies is the Advanced Spectroscopic Portals (ASPs). These are advanced nuclear screening portal that not only indicate the presence of radioactive materials but also pinpoint their exact location within the cargo, potentially taking days off a full container search. But however promising, questions have been raised as to the testing protocols used to validate the technology for large-scale dissemination, and the final answer as to whether the portals truly do what they are billed to do has yet to be given. Additionally, cost overruns for the US initiative have plagued the programme, which has grown from $1.3bn to an estimated $3.8bn at its conclusion.

Congressional Representative Bart Stupak (D-Mich), who has held a series of inquiries into the cost overruns and questionable testing protocols of the new ASPs, is doubtful that these new monitors are any better than the old. "The next generation of equipment will only be as good as the next salesman knocking on the door of the Department of Homeland Security," Stupak said during a hearing inquiry.

With all the money being thrown at the problem, and new initiatives and radiation detection technologies and integrated communications being devised to ensure security, do you really feel any safer? If the global community is unable to stop drug trafficking across their borders or high sea piracy in their own waters, then what are the chances of creating a seamless security perimeter for radiological and nuclear weapons?

While these global radiological and nuclear security initiatives appear to be putting forth a good effort and can be commended, their near-sighted focus has primarily resided upon shipment containers and port security. They do not address the "people factor" – the possibility of individuals from neighbouring countries hand-carrying radiological materials across borders and into schools, public events or any other arena where contamination can be widespread. They also do not address contingencies should another hijacked airplane be purposefully flown into a large nuclear reactor site. These security programmes more resemble Swiss cheese than a seamless nuclear and radiological security perimeter.

Money doesn't always equal results.