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# CBRNE NEWSLETTER TERRORISM

*E-Journal for CBRNE-CT First Responders*



**DIRTY NEWS**

[www.cbrne-terrorism-newsletter.com](http://www.cbrne-terrorism-newsletter.com)



## Two charged for plot to use 'killer' radiation device

Source: <http://gantdaily.com/2013/06/19/two-charged-for-plot-to-use-killer-radiation-device/>

A General Electric mechanic and an electronics firm employee have been arrested and charged in Albany with conspiracy to support terrorists and use a weapons of mass destruction for building and trying to sell a radiation-emitting device to kill people.



investigating by sending an undercover FBI agent to act as interested in the weapon and by recording Crawford's phone calls.

The FBI agent met and talked with Crawford at a Scotia restaurant a year ago and learned that he is a member of the United Northern & Southern Knights of the Ku Klux Klan. Crawford told the agent he will build a powerful industrial x-ray machine powered by batteries and source the needed x-ray tubes from a metal shop.

Crawford recruited Feight to assist him design and build the device.

In December, the FBI obtained a warrant to monitor Crawford's phone calls, e-mails and text messages to Feight.

A federal complaint unsealed on Wednesday identified the suspected conspirators as Glendon Scott Crawford, 49, of Galway and Eric J. Feight, 54, of Hudson.

The complaint described Crawford's weapon as can be placed in the back of a van to covertly emit ionizing radiation to sicken or kill the target person. Feight, who works for a manufacturer of electronic control devices in Columbia County, agreed to help Crawford construct the electronic control of the device. The weapon was not completed as Crawford failed to obtain a radiation material.

Crawford's plot was discovered after he visited an Albany synagogue and called a Jewish organization in April 2012 to ask if someone is interested to help him develop a weapon that Israel can use to kill its enemies while they sleep. Someone at the synagogue alerted the police, which in turn reported it to the FBI. A Joint Terrorism Task Force then started



Feight delivered the remote control device to Crawford on May 20 in Albany. They later tested the device, which can be triggered from half a mile away.

Undercover informants met with the suspects on June 12 and pretended to be South Carolina Ku Klux Klan members interested to buy and finance the completion of the weapon. The FBI Joint Terrorism Task Force arrested Crawford and Feight on Tuesday.





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### U.K. nuclear disaster exercise reveals worrisome lapses in emergency response

Source: <http://www.homelandsecuritynewswire.com/dr20130620-u-k-nuclear-disaster-exercise-reveals-worrisome-lapses-in-emergency-response>

Up to six times a year, U.K. nuclear weapons are transported in heavily guarded convoys between production facilities in Aldermaston and Burghfield in Berkshire, where the nuclear bombs are manufactured, and the Royal Naval Armaments Depot at Coulport on Loch Long in Argyll. The trips are required because scientists must regularly examine the 200 Trident missile warheads in order to make sure they are operationally reliable and properly maintained. Every three years, the U.K. Ministry of Defense (MoD) conducts a drill aiming to test how various agencies respond to an accident involving the convoy carrying the nuclear warheads. An internal report on the last drill notes many problems in the response to the simulated accident, including five-hour wait for weapons experts, confusion over radiation monitoring, and ambulance crews refusing to take contamination victims to hospitals.

An emergency drill has exposed worrisome vulnerabilities in the ability of U.K. authorities effectively to handle a catastrophic motorway pileup in which a convoy carrying a nuclear bomb burns and spreads a cloud of radioactive contamination over nearby communities.

The *Guardian* reports that an internal report by the Ministry of Defense (MoD) reveals that the emergency services faced “major difficulties” in responding to the mocked-up accident near Glasgow because they received no help from MoD weapons experts for more than five hours.

The MoD reports, along with a video from the exercise, were obtained by the Nuclear Information Service, which monitors weapons activities.

The report goes on to say that the response by the twenty-one government agencies involved was disorganized.

Moreover, heated disagreements between staff from some of these government organizations and ambulance crews over how to handle and treat casualties contaminated with radioactivity at the crash site caused “considerable delay,” resulting in one victim being declared dead.

There were other problems: outdated, paper-based communications systems; poor mobile phone signals; conflicting scientific advice on

health hazards; and confusion over radiation monitoring.

The *Guardian* notes that up to six times a year, nuclear weapons are transported in heavily guarded convoys between production facilities in Aldermaston and Burghfield in Berkshire, where the nuclear bombs are manufactured, and the Royal Naval Armaments Depot at Coulport on Loch Long in Argyll. The trips are required because scientists must regularly examine the 200 Trident missile warheads in order to make sure they are operationally reliable and properly maintained.

Every three years, the MoD conducts a drill aiming to test how various agencies respond to an accident involving the convoy carrying the nuclear warheads. The last exercise, codenamed Exercise Senator 2011, was conducted on 13-15 September 2011. More than 1,000 people and twenty-one public agencies were involved, among them police, fire, and ambulance services, local authorities, the Scottish government, and the U.K. Cabinet Office.

The *Guardian* reports that the accident scenario involved “a series of catastrophic, highly improbable events” which had a large truck suffering an offside front tyre blowout while travelling north on the M74, near junction five at Bellshill to the south of Glasgow.

The truck crashes through the central median and into one of three nuclear weapons carriers heading south. One weapons carrier swerves and topples over and burst into flames, resulting in plutonium and uranium leaking from damaged warheads. A second weapons carrier had to take evasive action and collided with another truck. About 100 people are contaminated with radioactivity from the accident, seven of them suffer serious injuries, and two are killed.

The exercise was carried out in a field near HMS Gannet, a Royal Navy search and rescue base at Glasgow Prestwick airport, with co-ordination centers in East Kilbride, Glasgow, London, Bristol, and Aldermaston.

The MoD’s Defense Nuclear Safety Regulator says the most serious problem revealed by the exercise was





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the sheer amount of time it took MoD's experts responsible for coordinating responses to such accidents to arrive from their base at Abbey Wood in Bristol to the police's emergency control center in East Kilbride. From the time they were informed of the accident, it took them five and a half hours to get to the scene.

"This lack of support created major difficulties for the multi-agency response, which struggled to attain a meaningful understanding of the issues," said the regulator's report. The absence of MoD expertise "over such an extended and critical period was not acceptable."

The report also pointedly noted that the Scottish Ambulance Service refused to transport two seriously injured people to a local hospital because the victims were contaminated with radioactivity. Because the ambulance crews refused to get the victims to a hospital, Royal Marines and MoD police had to use military vehicles to do so. "There were periods when the response became disorganized, and it was less than clear who was in charge at the scene," said the regulator. Discussions with ambulance staff "resulted in

considerable delay in developing a plan to manage the [contaminated] casualties."

Additional delays in dispatching paramedics to retrieve radioactive casualties were "escalated" to incident commanders "but without adequate resolution." A footnote added: "Another serious casualty was declared dead due to the extended delay."

A second report dealing with Exercise Senator 2011, out together with input from all the agencies involved lists additional problems: concerns over poor mobile phone coverage, and the fact that the first written notification of the accident received by the police was by fax.

The use of paper to pass on vital messages at the police's East Kilbride control center was "not fit for purpose and exposes the force and other agencies to criticism and potential reputation damage," the report said.

All these problems notwithstanding, MoD insisted that the exercise had successfully demonstrated its ability to cope in an emergency. "Some improvements were identified to further enhance procedures and these have since been addressed," said a spokesman.

### Nuclear convoy could explode, admits MoD

Source: [http://www.robwards.com/2005/07/nuclear\\_convoy\\_.html](http://www.robwards.com/2005/07/nuclear_convoy_.html)

TRIDENT warheads carried regularly by road to the Clyde naval base could explode if they are involved in a major crash, an internal Ministry of Defence report reveals.

The report – which seems to contradict previous MoD assurances on safety – states that the warheads' key safety feature could be disabled by a plane crash or vehicle pile-up. In the worst-case scenario, this could trigger a nuclear explosion, unleashing a burst of lethal radiation.

Defence ministers and MoD officials have repeatedly insisted that such an accident is impossible. And last week an MoD spokesman claimed its own report was mistaken, saying that an explosion could be ruled out because the warheads were not armed.

The MoD stance was dismissed by Jane Tallents from Nukewatch Scotland, a group which monitors nuclear weapons convoys.

"We have been misled," she said. "The prospect of a nuclear bomb accidentally exploding while it is being transported through

Glasgow, Edinburgh, Stirling or anywhere else is too horrific to contemplate. The only safe option is to dismantle every warhead."

Convoys of nuclear weapons travel about six times a year between the Atomic Weapons Establishment at Burghfield in Berkshire and the Royal Naval Armaments Depot at Coulport on Loch Long. According to the MoD, they pass through 21 local authorities in Scotland.

The safety of the convoys, which involve more than six vehicles, has been assessed by the MoD's directorate of nuclear movements and nuclear accident response group. In a report dated December 16, 2004, it said there is a risk of an "inadvertent yield" from a nuclear explosion.

This could result in huge radiation doses to members of the public of between one and 10 sieverts, it says. According to the government's Health Protection Agency, doses of more than four sieverts can cause acute radiation poisoning and death within days.





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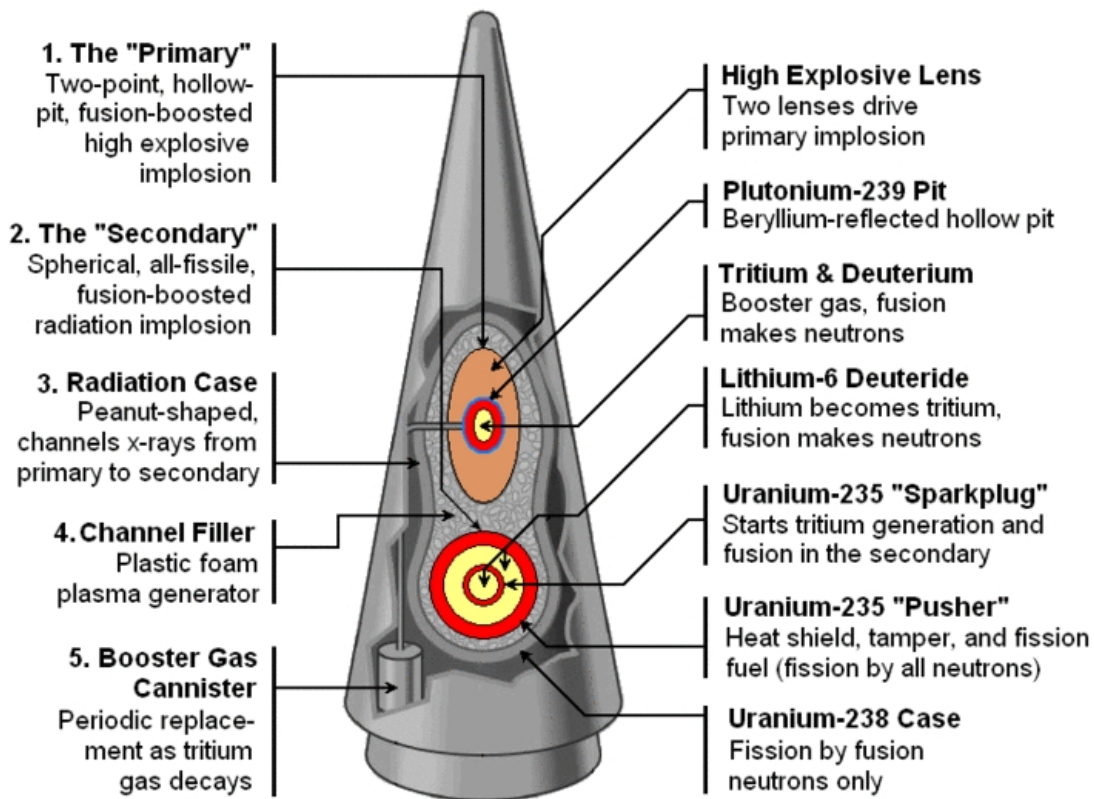
“Multiple failures” caused by vehicle accidents or aircraft crashes could mean that “the nuclear weapon may not retain its single point safety nature”, the report says.

“Single point safety” is the main barrier to an accidental nuclear explosion. To explode a nuclear bomb, a sphere of plutonium has to be

This new information blows away our perceptions of what the hazards are.”

Ruskell is also concerned that nuclear weapons convoys could be a target for terrorists. “Given the nature of post-9/11 politics and terrorism, nuclear weapons are more of a liability than a deterrent,” he warned.

**W88 Warhead for Trident D-5 Ballistic Missile**



rapidly compressed by a series of conventional high explosives. Bombs are designed so that if they suffer a hit at a single point, all the explosives will not detonate.

The MoD report argues the chances of an accidental explosion are so low – less than three in a billion per year – it is therefore acceptable. “Nuclear safety risks are tolerable,” it concludes, “when balanced against the strategic imperative to move nuclear weapons.” But this is angrily rejected by Mark Ruskell, the Green MSP for Mid Scotland and Fife, who obtained the report under the Freedom of Information Act.

“The horror of a nuclear accident anywhere on a convoy route would be so great that even a minute risk is utterly unthinkable,” he said.

“I have always assumed that while leaks of nuclear material from a damaged convoy are feasible, an explosion would be impossible.

Nigel Chamberlain, a nuclear analyst with the British American Security Information Council in London, accused the MoD of transporting nuclear warheads across the country “with a distasteful mix of secrecy, arrogance and complacency”. Reassurances about the inherent safety features of warhead design had now been exposed as “overstated”, he said.

The MoD has always maintained a convoy accident could not trigger a nuclear explosion. “Even in the highly unlikely event of an accident involving the detonation of the conventional explosives within a warhead and a subsequent fire, there would not be a nuclear explosion,” says a statement from the MoD’s Atomic Weapons Establishment.

Yesterday, the Ministry of Defence did not deny that there were circumstances in which a nuclear bomb could lose its single point





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safety. But an MoD spokesman suggested that this may not be the only protection against accidental detonation. “A nuclear bomb-type explosion could not take place because the nuclear weapon is unarmed. It is in such a state that fission could not take place,” he said. “There has never been an accident involving a nuclear weapons convoy which has led to, or has come anywhere near leading to, any release of radioactive contamination. We are confident that the continued application of stringent safety procedures will continue to prove effective in preventing such an accident.” But Frank Barnaby, an expert on nuclear bombs who used to work for the Atomic Weapons Establishment, was more sceptical. “I wouldn’t be prepared to take the MoD’s word for it, given the seriousness of the consequences,” he said.

The MoD’s “obsessional secrecy” prevented any independent assessment of the risks, he argued. “The public have the right to be totally

reassured, but because of the secrecy that is not possible. That is worrying.”

The MoD report is one of a series of documents released under the Freedom of Information Act about plans to speed up the nuclear bomb convoys. In order to reduce the risk of terrorist attack, the MoD has changed to a system of “continuous running” which cuts the time taken for the convoys to complete their journey from three days to 24 hours.

But the documents say that the change, “if inadequately conceived or implemented, would have the potential to create a significant hazard to the operation”. Dangers cited included poor visibility at night, tiredness and getting lost.

In the past four months, the convoy has been seen making two journeys through Scotland. On April 1, anti-nuclear campaigners claim the 44-tonne truck carrying the bomb went over a bridge with a 13-tonne weight limit near Stirling. On May 7, the convoy was halted in Balloch, north of Glasgow, when a protester lay down in the road in front of it.

### THE DANGERS OF A BOMB EXPLODING BY ACCIDENT

A safety assessment prepared by the Ministry of Defence says that a nuclear weapon involved in a serious road or aircraft accident could explode and expose people to radiation doses of between one and 10 sieverts.

Radiation dose / health effects:

- >half a sievert / nausea, diarrhoea, hair loss, drop in white blood cell count
- 1-2 sieverts / some people die within weeks from bone marrow damage and infections
- 4 sieverts / 50% of people will die from acute radiation poisoning
- 6 sieverts and above / everyone exposed will die

*Source: Health Protection Agency*

### THE SCOTTISH COUNCILS CROSSED BY NUCLEAR WEAPON CONVOYS

Argyll & Bute, City of Edinburgh, City of Glasgow, Clackmannanshire, Dumfries & Galloway, East Ayrshire, East Dunbartonshire, East Lothian, East Renfrewshire, Falkirk, Fife, Highland, Midlothian, North Lanarkshire, Perth & Kinross, Renfrewshire, Scottish Borders, South Lanarkshire, Stirling, West Dunbartonshire, West Lothian.

In addition to the 21 councils in Scotland, military nuclear materials may pass through or fly over 13 local authorities in Wales and 91 in England.

## Dirty Bombs and Radiological Weapons – Securing Upstate New York

By Robert L. Domenici, LTC (USA Ret.), MPA, MSS and Steve Melito, MA

Source: <http://news.cbrnresourcenetwork.com/newsDetail.cfm?id=177>

Several years ago, researchers at the University of Southern California’s CREATE Homeland Security Center estimated the cost of a “dirty bomb” attack on Los Angeles at \$16 billion over the course of a decade. Albany, New York is much smaller than Los Angeles, of

course, but upstate New York remains an area of concern because of our border with Canada, proximity to large metropolitan areas, and high-tech economy.





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Last week, the Albany FBI Joint Terrorism Task Force arrested two upstate New York men for allegedly designing a vehicle-mounted weapon that could aim a high-energy beam of lethal radiation at human targets. According to a

Boston Marathon Bombing also underscores the threat posed by non-conventional explosives or improvised explosive devices (IEDs).

Like an IED, an RDD can be crude yet still



criminal complaint unsealed in federal court, the pair unsuccessfully sought to sell their remote-controlled radiation device to a Jewish group or the Ku Klux Klan.

Glendon Scott Crawford, an industrial mechanic at General Electric in Schenectady, and Eric J. Feight, a computer software specialist from nearby Columbia County, were charged with conspiracy to provide material support to terrorists for use in a weapon of mass destruction (WMD). Prior to their arrest, the two men repeatedly met with an undercover FBI agent posing as a supplier of commercially-available equipment, including X-ray tubes.

**The Cost of a Dirty Bomb Attack**

Although Crawford and Feight failed to obtain a radiation source or build a fully-operational weapon, their arrest in our backyard reminds us of the potential danger of radiological weapons, including so-called “dirty bombs” or radiological dispersal devices (RDDs) that combine conventional explosives with radioactive materials. Recent incidents such as

effective. Several years ago, researchers at the University of Southern California’s CREATE Homeland Security Center estimated the cost of a “dirty bomb” attack on Los Angeles at \$16 billion over the course of a decade. “Terrorism can have a much larger impact than first believed,” said Adam Rose, co-author of the CREATE study. “The economic effects of the public’s change in behavior are 15 times more costly than the immediate damage in the wake of a disaster.”

Albany, New York is much smaller than Los Angeles, of course, but upstate New York remains an area of concern because of our border with Canada, proximity to large metropolitan areas, and high-tech economy. Home to large multi-national companies and small high-tech startups, New York’s Tech Valley is more than a pass-through point on the way from Manhattan to Montreal.

**Risk Factors**

Geographically, the region north of New York City is close to Canada and shares a 445-mile border with





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America's northern neighbor. The U.S. Department of Homeland Security (DHS) and the Canada Border Service Agency have stopped previous terrorist plots, but experts remain concerned that terrorists could smuggle WMD materials across the border, which includes four of the most heavily traveled crossings between the U.S. and Canada.

Upstate New York's proximity to major population centers is another risk factor. The distance from the Canadian border to Manhattan spans hundreds of miles, but interstate highways such as I-87 and I-90 provide ease of access. Remote parts of the vast upstate region could also offer places for terrorists to assemble a "dirty bomb" that claimed lives, caused illness and injuries, disrupted the local, regional, and national economy, and delivered a devastating psychological impact.

All of upstate New York isn't remote, however. This highlights another risk factor – and one which the Crawford-Feight terrorist plot underscores. With its hospitals, universities, technology-based companies, and NYS Centers of Excellence, New York State could unwittingly provide terrorists with the materials and training they need to design and build a radiological weapon. From the Cesium-137 that hospitals use to treat cancer to the engineering training that students receive on-the-job and at universities, the risks are real.

### Time for Solutions

New York State must carefully screen all who have access to its Centers of Excellence, public-private partnerships that support high-tech ventures and encourage the rapid commercialization of innovations in

nanotechnology, bioinformatics, photonics, environmental systems, wireless applications, and information technology (IT). Simply put, we cannot provide technologies and training to those who would do us harm.

Other public institutions, as well as private companies and organizations, also have a role to play – and it's in their best interest to do so. If a hospital or other multi-million dollar manufacturing facility is rendered unusable because of a "dirty bomb" attack, the cost to taxpayers and investors would be enormous. Universities and corporations could also be held liable for providing the training and materials used to disable critical infrastructure. Finally, as the study from the CREATE Homeland Security Center indicates, cleanup costs and potential legal expenses aren't the only expenses involved in recovering from a radiological attack. In addition to disrupting our economy, "dirty bomb" terrorism would have a significant psychological impact.

Here, each of us should also consider our own circumstances. Would you want to work in, receive medical treatment in, or send your child to school in a building that was affected by a radiological dispersal device (RDD)? Would you and members of your community be satisfied with knowing that a cleanup had occurred, or would you still have concerns about safety?

The time for securing radiological materials is now. Access control is just part of the solution, however. Unless governments, businesses, and universities carefully screen all who would receive training in these dual-use technologies, the risk remains that a potential terrorist could gain the know-how to design and build a radiological weapon.

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*LTC Domenici collaborated on this article with Steve Melito, the Managing Editor for the Responder Rundown, a digital publication from the CBRN Resource Network. Melito is also a Business Development Partner for Strategic Response Initiatives (SRI), U.S. Business Development Representative for Defence and Security Alert (DSA), author and editor for Security and Border Protection magazine by Tactical Defense Media, and the owner of Thunderbolt Business Services.*





**Worst Hanford tank may be leaking into soil**

Source: <http://www.king5.com/news/investigators/Worst-Hanford-tank-may-be-leaking-into-soil-212259211.html>

The first ever double-shell tank to have leaked at Hanford may be in far worse condition than anyone imagined. Hanford workers conducting

how to handle AY-102's leak in what's called the government's "pumping plan." The plan calls for the tank to be pumped of its contents by the year 2019. An initial review of the course of action appeared inadequate to state officials. State and federal law call for a leaking nuclear waste tank to be emptied and deemed unusable within 24 hours, or "whatever is practicable" of the detection of a leak.

Now that the tank's condition may be far worse than previously known, state and federal officials are on the fast track to find solutions.

"ORP has notified the Washington state Department of Ecology and U.S. Environmental Protection Agency, and



routine maintenance on the tank, known as AY-102, Thursday were shocked to find readings of radioactivity from material outside the tank. Until now leaked nuclear sludge had only been detected in what's known as the tank's annulus -- the hollow safety space between the tank's two walls. The tank has been at the center of a KING 5 investigation for months. The underground carbon steel vessel holds 865,000 gallons of the most chemically contaminated, thermally hot, corrosive and radioactive material at the site.



The U.S. Department of Energy, in a unique move, issued an email late Thursday night about the turn of events.

"On Thursday, June 20, 2013, workers detected an increased level of contamination during a routine removal of water and survey of (AY-102's) leak detection pit...The source of contamination is not yet verified, but may be an indication of a leak from the AY-102 tank's secondary containment," wrote Lori Gamache, spokesperson for the DOE's Office of River Protection (ORP) in Richland.

The leak detection pit is located underneath the massive tank and has contact with the soil.

Just last week the Dept. of Energy submitted a detailed guide to the state of Washington on

convened an engineering analysis team to conduct additional sampling and video inspection to further assess the elevated radiation levels and determine the source of the contamination," said Gamache.

The KING 5 Investigators, in a multi-part investigation, "Hanford's Dirty Secrets" exposed that the federal government's contractor in charge of all 177 underground storage tanks at the site, Washington River Protection Solutions (WRPS), failed to investigate scientific evidence of the leak for nearly a year before conducting a thorough inspection in August 2012.

Despite signs of the leak and advice from veteran employees that the tank

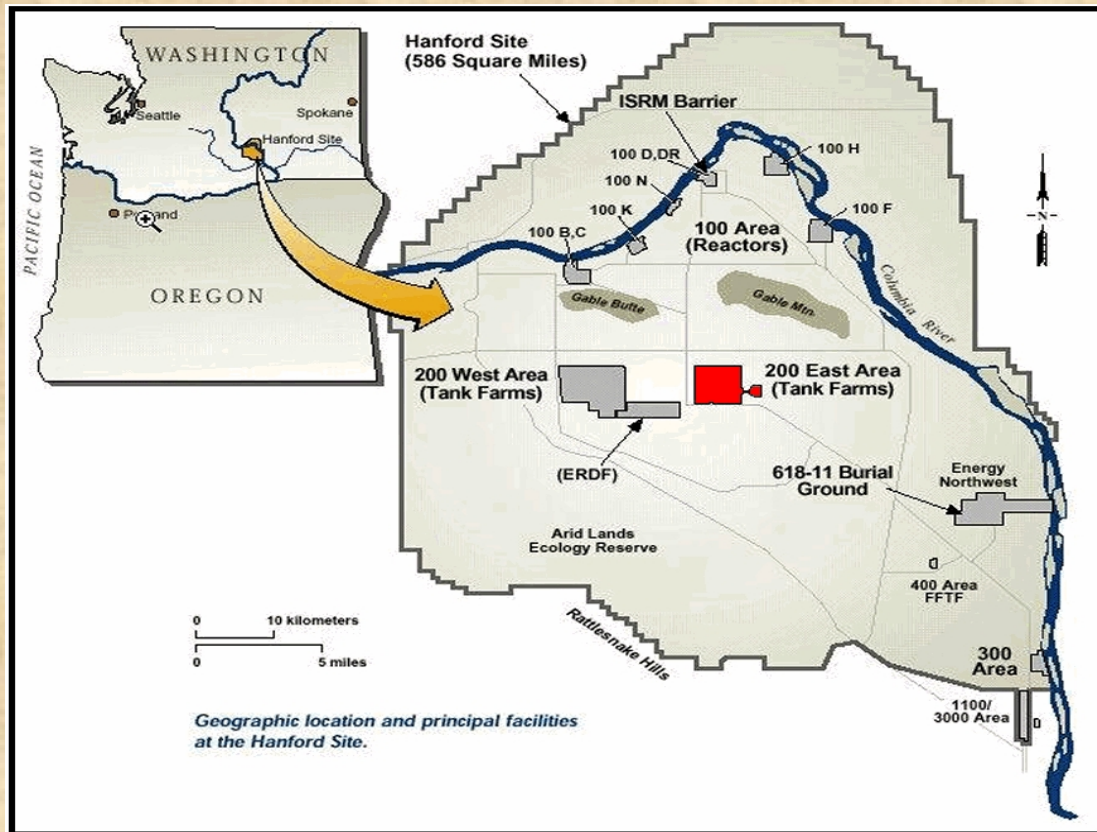




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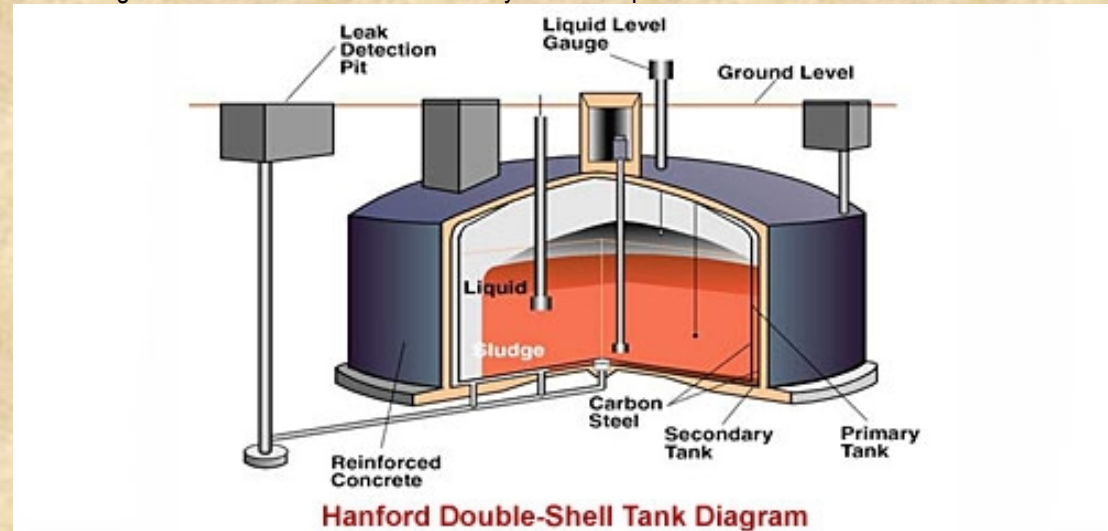
was compromised and leaking nuclear by-products in 2011, WRPS and the DOE made the leak public in October 2012.

On Wednesday the Obama administration's top environmental boss, Secretary of Energy Ernest Moniz, visited Hanford for the first time



In addition, KING 5 revealed WRPS wasted millions of tax dollars on the tank during the months signs of the leak were discounted by

since his confirmation to see first-hand the country's most contaminated site. He assured reporters before his tour that the AY-102 leak



managers. Instead of confronting evidence that the tank was broken, WRPS forged ahead with engineering, design, and equipment procurement work to upgrade the tank to eventually be a waste feed delivery source to the site's Waste Treatment Plant. Now that work is useless because of the tank's condition.

was safely contained in the annulus and that the leak had not grown. Photos of the leaked toxic sludge obtained by KING 5 on Thursday showed an increase of bright green, wet leaked material from what had been documented by workers the week before.





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AY-102 is one of 28 double shell underground nuclear storage tanks at Hanford. These are newer, sturdier tanks than the older single shell tanks at the site, six of which are known to currently be leaking nuclear waste into the environment. The double-shell tanks were hoped to be a saving grace for Hanford -- a

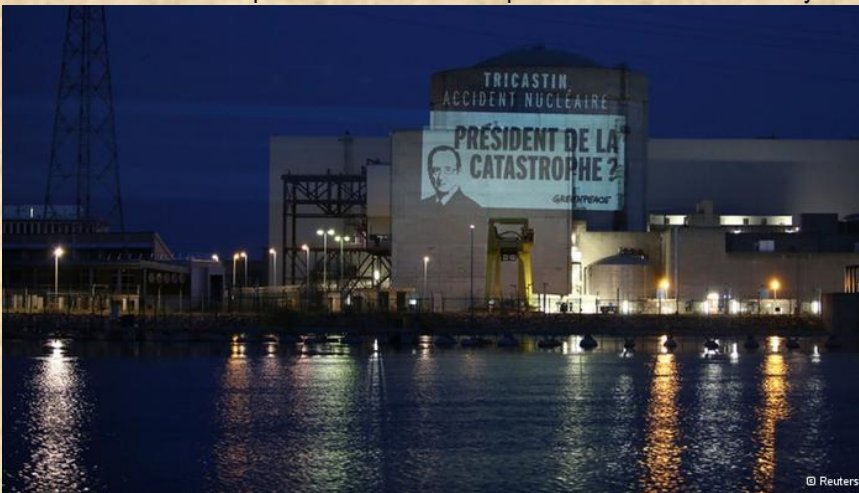
way to safely contain 56-million gallons of waste from decades of plutonium production until the treatment plant was finished. That plant is riddled with technical problems and cost overruns. It's uncertain when or if the current planned plant will be operational.

**Greenpeace activists occupy French nuclear plant**

Source: <http://news.yahoo.com/greenpeace-activists-occupy-french-nuclear-plant-074449691.html>

Greenpeace activists occupied a French

By mid-afternoon, all of the activists had been arrested and were being held in a nearby police station, Greenpeace France said on its web site.



Speaking at a news conference President Francois Hollande said France "is very much attached to nuclear safety," and that everything was being done "to assure us that this nuclear safety is absolutely respected."

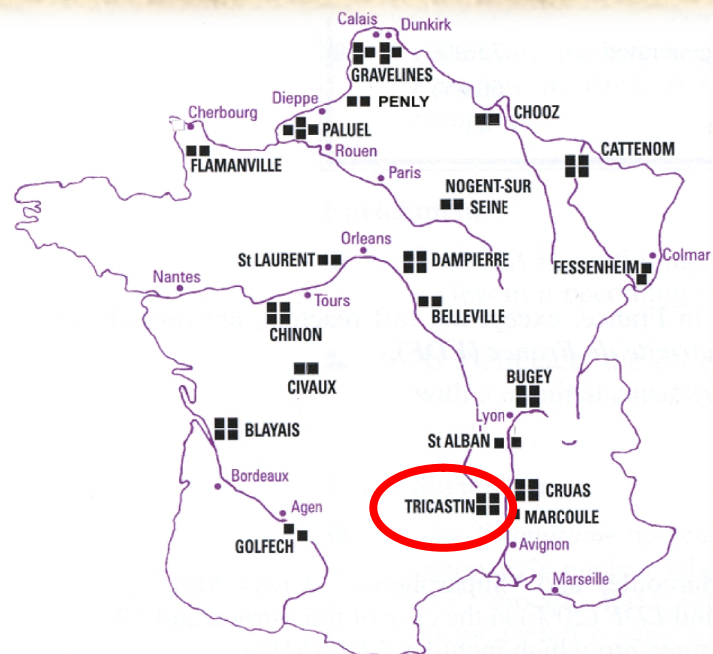
France is among the most nuclear-dependent countries in the world, with reactors producing about 80 percent of its electricity.

In 2008, the Tricastin plant reported several incidents that angered anti-nuclear

nuclear power plant site before dawn Monday — a media stunt deeply embarrassing to the government, which is intent on demonstrating that France's reliance on nuclear power is safe.

Around 30 activists from the environmental group invaded state-owned nuclear power utility Electricite de France's Tricastin power plant complex in southern France. They projected a video on the side of one of the plant's buildings that said "Tricastin Nuclear Accident" and showed the image of a giant crack forming across the building's facade. Activists also hung a giant banner with President Francois Hollande's face and the words "President of the Catastrophe?"

France's nuclear safety authority said in a statement that so far the intrusion had no impact on the plant's safety.



groups, including a leak of unenriched uranium into two nearby rivers and the release of radioactive particles from a pipe.





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**Greece – Health consequences on First Responders following UAV crash**

Source: Greek blogs

During the landing of a Hellenic Air Force UAV-SAGEM (photo), its parachute failed to open and the



vessel due to high speed winds (30-40knots) was finally crashed and certain parts of it were set on fire. Four fire-fighters on duty successfully extinguish the fire before the fuel tanks were affected. After the incident the four employees started experiencing symptomatology of acute poisoning (headaches, abdominal pain, generalized malaise, respiratory tract burning, burning sensation in the tongue, persistent cough and difficulty in breathing. All of them were hospitalized.

These symptoms were initially attributed to the burning of thermal FLIR camera on board containing about one kilogram of germanium (GeO<sub>2</sub>, GeH<sub>4</sub> and GeCl<sub>4</sub> – poisons affecting the respiratory system, the kidneys and liver; the reaction of germanium with water produces germanic acid that causes heart problems). According to US FDA the allowed levels of these oxides in the air are below 0.6 mg/m<sup>3</sup> of air. A second source of contamination might be due to existing thorium (Th-232) used in optical systems (thorium produces a radioactive gas, radon-220, as one of its decay products. Secondary decay products of thorium include radium and actinium. In nature, virtually all thorium is found as thorium-232, which undergoes alpha decay with a half-life of about 14.05 billion years). But the military CBRN unit deployed on site reveals no chemical or radiological contamination. Lab results might shed light to possible causes of clinical symptoms calimed.

**Drone Fighter Jet Comes In 'Hard And Fast' In Fiery Crash Near US 98 In Florida**

Source: <http://www.businessinsider.com/drone-crashe-florida-tyndall-2013-7>

July 17 – Reports are coming in that a "QF-4" drone fighter jet has crashed near U.S. 98 in Florida, via



eyewitnesses on Twitter and local news station WHJG.

The drone was from Tyndall Air Force base and represents the second crash in the last 30 days.



Eye witnesses say the large drone, presumed to be a QF 4 came in hard and fast, exploded and sent up a large black cloud.

Traffic is blocked on Tyndall on US 98 and is being turned

around.

Though pilots can and sometimes do fly in the cockpits of these drones, WHJG confirms this crash was of an unmanned drone. The military told WHJG that a self-destruct explosive charge is usually attached to these drones, just in case.





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The QF-4 is a conversion of excess Vietnam-Era F-4 Phantom by BAE systems in California. The company has performed roughly 200 drone conversions of this model since 1995. Tyndall's last drone crash was out over the Gulf of Mexico. The base was also home to an F-22 Raptor crash late last year, also near U.S. 98.

**Army Scours Texas Base for Leaked Nuke Contaminants**

Source:[http://www.nti.org/gsn/article/army-scours-texas-base-leaked-nuke-contaminants/?sthash.IMkVwCZW.mjjo&goback=.gde\\_3904448\\_member\\_259777704](http://www.nti.org/gsn/article/army-scours-texas-base-leaked-nuke-contaminants/?sthash.IMkVwCZW.mjjo&goback=.gde_3904448_member_259777704)

The United States on Tuesday said WMD specialists were scouring Fort Bliss in Texas



for radioactive contaminants that might have escaped from a one-time nuclear arms storage shed, the Associated Press reported. Radioactive material detected in a 2-month-old probe might have slipped through cracks in an

aging coat of epoxy applied to seal off radiological particles on the structure's interior walls, base spokesman Maj. Joe Buccino said. The substance might be uranium from "old unsealed nuclear weapons," according to the official.

Contaminants would not reach people living roughly a mile from the site, but "there is some low level of contamination that could be transferred to personnel," Buccino said. Approximately 30 personnel regularly at the site are undergoing radioactive material checks, but the spokesman said "there is no immediate health or safety risk" to additional troops who have handled arms stored in the structure since 2003.

Investigators responded to a tip by an unidentified individual who worked at Fort Bliss in the 1950s, when the base was under Air Force control. The Army will

search for radiation-tainted materials said to have been interred in airtight holders nearby. It was unclear why the Air Force did not provide details on the reported hazard to the Army, which took over the site in 1966.

**Specialized gas detection helps prevent nuclear weapons proliferation**

Source: <http://www.homelandsecuritynewswire.com/dr20130725-specialized-gas-detection-helps-prevent-nuclear-weapons-proliferation>

Researchers aim to design a system capable of sensing, from among the loud signals of a lot of gases, the weak signals from specific gases which are signs of nuclear weapons proliferation. The researchers believe their gas correlation technique will prove ideal for a simple, inexpensive sensor to monitor those few illusive gases. This could change how the nation thinks about monitoring the spread of nuclear weapons. Instead of single-point measurements taken with expensive sensors deployed after someone suspects a problem,

24/7 continuous monitoring could find leaks early.

Trying to sniff out traces of hard-to-detect gases can be like trying to hear a whisper at the other end of a very large, very crowded, very noisy room.

Sandia National Laboratories' Project Neptune aims to design a system capable of sensing, from among the loud signals of a lot of gases, the weak signals from specific gases which are signs of nuclear weapons proliferation. The researchers believe their gas correlation technique will





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prove ideal for a simple, inexpensive sensor to monitor those few illusive gases.

“The hope is to detect gas early so there’s evidence before a nation gets too far along in a proliferation program,” said Jeff Mercier, a manager in Sandia’s Mission Science and Analysis Department and Neptune’s principal investigator.

test was calibrated, “so we knew where they were releasing things, what they were releasing and when they were releasing it,” Vigil said.

While the sensor and software worked well, the test conditions were different from those the instrument was designed for. The team planned to capture an image of something



Sandia National Laboratories’ Todd Embree inspects one of the Neptune sensor’s two liquid-nitrogen-cooled cameras before field installation. Neptune underwent field testing in Nevada in December 2012. (Credit: Photo by David Karelitz)

With about one photon out of every million coming from the signal the Neptune sensor is seeking, “it’s a very, very hard problem,” he said.

The goal is an imaging technique that could be used in airborne- or space-based systems, said Steve Vigil, project team lead. The three-year project has wrapped up but was continuing to analyze data from a December test of the prototype Neptune gas correlation imaging system.

### Field test gathers data

A Sandia Lab release reports that the field test at the Nevada National Security Site piggybacked on a larger, separate test. The

about the size of a meter from half a kilometer away, but ended up trying to image something that was only about a centimeter in size, Vigil said.

Neptune was funded under the Nuclear Fuel Cycle Remote Sensing portfolio of the National Nuclear Security Administration’s Office of Proliferation Detection. A small Albuquerque business, CIC Photonics, which designs and produces analytical and industrial instrumentation and sampling systems, worked with Sandia to design and build Neptune’s gas cells and did calibrated measurements of the cells.

The gas cells are the key. Sandia’s instrument contains two, each weighing around twenty pounds, in a stainless steel box about 3 feet square by 16 inches high. A beam splitter separates sunlight coming in the sensor’s window into two paths —





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one going to a cell filled with the gas sought and the second to a cell with a different gas.

Researchers are not saying what gases they want to detect, but Mercier said operators can identify whether the gas they seek is present by comparing signals on the two paths.

### New twist on old technology

He called the work “a newer, more capable twist on a proven scientific concept.”

Gas correlation technology has been around for decades, but modern focal plane arrays, optical design, computer codes and new materials made it practical for an imaging system, said Remote Sensing Portfolio manager Prabal Nandy.

The team uses sunlight to calibrate the instrument, which must operate in the daytime since it measures absorption of specific wavelengths of sunlight.

The basement Opto-Mechanical Research Lab where the prototype was built and tested is equipped with a periscope-like mirror system called a heliostat. A 40-inch sun-tracking mirror mounted on a post outside the building directs sunlight down a concrete-lined shaft, and a mirror at the bottom of the shaft directs the sunlight into the lab.

Neptune detects signals in infrared rather than visual colors humans can see. An operator watches for indications of the selected gas on a computer screen that displays a processed image from the sensitive focal plane arrays.

Take, for example, emissions from a smokestack.

“If our gas is not coming out the smokestack, we just see the smokestack. If our gas comes out, it looks like steam,” Vigil said. An operator also can gauge gas concentration, he said.

### Neptune differs from other detection systems

Greenhouse gas monitoring uses similar technology, the researchers said. Vigil said Neptune is different because it is ultimately aimed at detecting certain gases with a space-based system, “and that’s not something that’s commonly done.”

Mercier said technologies that detect more common gases are not sensitive enough for the gases the team wants to find.

The portable prototype operates from the Mission Science and Analysis Department’s Mobile Remote Sensing Laboratory, a 16-foot-long trailer modified for field testing operations.

The front two-thirds houses a computer room; the back third houses remote sensing instruments the department deploys, including Neptune. Operators simply lower the 8-foot-high rear trailer door to use the sensor.

Since gas correlation can detect extremely low gas concentrations, Nandy suggests it also could fill an important niche: finding suspected leaks in large industrial facilities.

Industrial inspection teams could easily use an imaging gas correlation sensor since it has no moving mechanical parts, operates like a video camera, does not require costly computer post-processing and is small enough to be driven around a factory in a truck. It is designed to locate where specific gases originate, even if they are not present all the time, Nandy said.

### A new way of monitoring

That could change how the nation thinks about monitoring, Nandy said. Instead of single-point measurements taken with expensive sensors deployed after someone suspects a problem, continuous monitoring could find leaks early, he said.

“Why not have 24/7 monitoring when the data is simple to interpret? You don’t have to wait years for health effects or environmental damage before the source of a leak or release is known,” he said. “Catching leaks in real time means that we can move away from a mode of punishing industry for accidents after the damage is done, and instead work with them to catch issues before they become problems. This means less damage to the environment, more efficient and profitable operations for the company and a healthier environment for all.

“New forms of monitoring technology developed here at Sandia allow manufacturing operations to become more efficient, clean and cost-effective, which will enable the next renaissance of American industry.”

Sandia can take on such complex problems because of its ability to turn ideas into prototypes — in this case, from a scientific concept to a field demonstration in three years, Nandy said.

“That’s what we bring to the table that’s unique,” he said. “The niche is not just in gas correlation, but in things that have never been done, ideas that have never been looked at this way, applications that have never used this technology.”





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**Hospitals failing to secure dirty bomb materials**

By Aaron Mehta

Source: <http://www.publicintegrity.org/2012/09/13/10850/hospitals-failing-secure-dirty-bomb-materials>

Since the September 11 terrorist attacks, Americans have been haunted by the idea that terrorist groups around the world could set off a “dirty bomb” — a simple explosive device that

the risk that potentially dangerous radiological sources remain unsecured and could be used as terrorist weapons.”

The improved security features, which include enhanced security doors, increased surveillance equipment and the installation of tamper alarms, have also been slowed by the voluntary nature of the upgrades. Because the hospitals are not required to undergo these upgrades, facilities looking to cut costs can decide the security upgrades aren’t worth the expense.

So far, 14 facilities, including four in “large urban areas,” have declined to take part in the security program. The facilities that have turned down the upgrades contain an estimated 41,000 curies, a standard unit of

measurement for radioactive material, which is significantly more than would be needed for a terrorist attack.

GAO inspectors found several incidents where radioactive isotopes were left unsecured and would be easily accessible to terrorists. For example, inspectors found a machine containing 2,000 curies of cesium-137, used in cancer treatments, stored on a wheeled pallet next to the loading dock at one facility, where it could easily have been wheeled down the hall and out the door. In another location, 1,500 curies of cesium-137 were kept behind a locked door — with the combination clearly written on the door frame.

As a result of the report, officials at GAO recommended that the government increase outreach to hospitals to raise awareness about the need for security upgrades, especially in highly populated urban areas. They also called for stronger NRC requirements for security, including dictating the specific placements of cameras and alarms. The GAO’s report recommended increased training for NRC



would scatter radioactive material to the winds, devastating a city.

Thankfully, that threat has never materialized. But the government’s watchdog is sounding alarms that terrorists looking to acquire the radioactive materials for such an attack could find them easily and unsecured at hundreds of hospitals around the country.

A report released Tuesday by General Accountability Office has found that only one out of every five hospitals that use high-risk nuclear isotopes for diagnosis and treatment have the recommended safeguards needed to secure the materials.

Over 1,500 hospitals in the U.S. use radiological sources that could be turned into dirty bombs, according to the National Nuclear Security Administration (NNSA), which shares purview over nuclear technologies with the Nuclear Regulatory Commission. NNSA has spent \$105 million to upgrade security at 321 hospitals, but the agency warns it will take until 2025 to upgrade all of the hospitals on their list. “The longer it takes to implement the security upgrades,” warns the GAO report, “the greater





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inspectors, some of whom told investigators that they felt ill prepared after a week-long training course.

In a response included with the report, the Nuclear Regulatory Commission agreed that expanding outreach to more hospitals would be a good idea. But while acknowledging GAO's recommendation for strengthening security upgrades, the NRC said that its standards are in line with those of the International Atomic Energy Agency, and argued that the security protocols would be adequate if they were followed correctly. Despite this argument, GAO stood by its recommendations.

Sen. Daniel Akaka (D-HI), who requested the report, called the findings "troubling."

"Delays in securing these materials on the mainland U.S. unnecessarily put the American people at risk," wrote Akaka in a statement. "We must strengthen domestic radiological security requirements and accelerate efforts to secure all medical facilities with radiological materials."

Radioactive materials are used to help diagnose and treat a number of illnesses, including cardiac disease and cancer. Millions of procedures are performed around the country each year using nuclear medicine.

Although no dirty bomb has been used in the U.S., GAO points to an accidental explosion in Brazil that occurred in 1987 when an abandoned teletherapy machine exploded, killing four people. That device contained 1,400 curies of cesium-137. The accident and

its aftermath caused about \$36 million in damages to the region, according to Brazil's government.

While acknowledging that all nuclear materials should be secured, some experts worry the focus on dirty bombs obscures the danger presented by the use of highly-enriched uranium in medical devices. Rather than a small improvised explosive, HEU could be used to make a bomb on the scale of those used in Hiroshima and Nagasaki.

"Dirty bombs are weapons of mass distraction, not weapons of mass destruction," says Alan J. Kupperman, who heads the Nuclear Proliferation Prevention Project at the University of Texas. "By contrast, a nuclear weapon from stolen HEU could kill tens of thousands of people."

Kupperman and others have pushed Congress to move on the American Medical Isotopes Production Act, which was passed by the House in 2011. However, the House version leaves open a potentially dangerous loophole, as reported by the Center earlier this year. An international treaty, signed in April, has also been criticized for not going far enough to restrict the use of highly enriched uranium in medical isotopes.

On Wednesday, the House Armed Services Committee held a hearing on security at nuclear power plants after a trio of activists, including an 82-year-old nun, broke into a sensitive facility outside Knoxville, Tenn.

► **Read full report at:** <http://www.gao.gov/assets/650/647931.pdf>

*Aaron Mehta joined the Center for Public Integrity in the summer of 2008. He primarily covers Money and Politics and National Security, but has also done stories touching on finance and the environment. A Boston area native, Mehta graduated from Tufts University in 2007. His stories have been published in The New York Times, Washington Post, POLITICO, ABC News and other publications. He is currently a Paul Miller Reporting Fellow.*

### **Tepco now admits radioactive water entering the sea at Fukushima No. 1**

Source: <http://www.japantimes.co.jp/news/2013/07/22/national/tepco-now-admits-radioactive-water-entering-the-sea-at-fukushima-no-1/#.Ufp6Tqz7CF->

Fukushima nuclear plant operator Tepco on Monday admitted for the first time that radioactive groundwater is flowing into the sea, fueling fears that marine life is being poisoned.

The admission came a day after voters handed the largely pro-nuclear Liberal Democratic Party of Prime Minister Shinzo Abe — and ally New Komeito



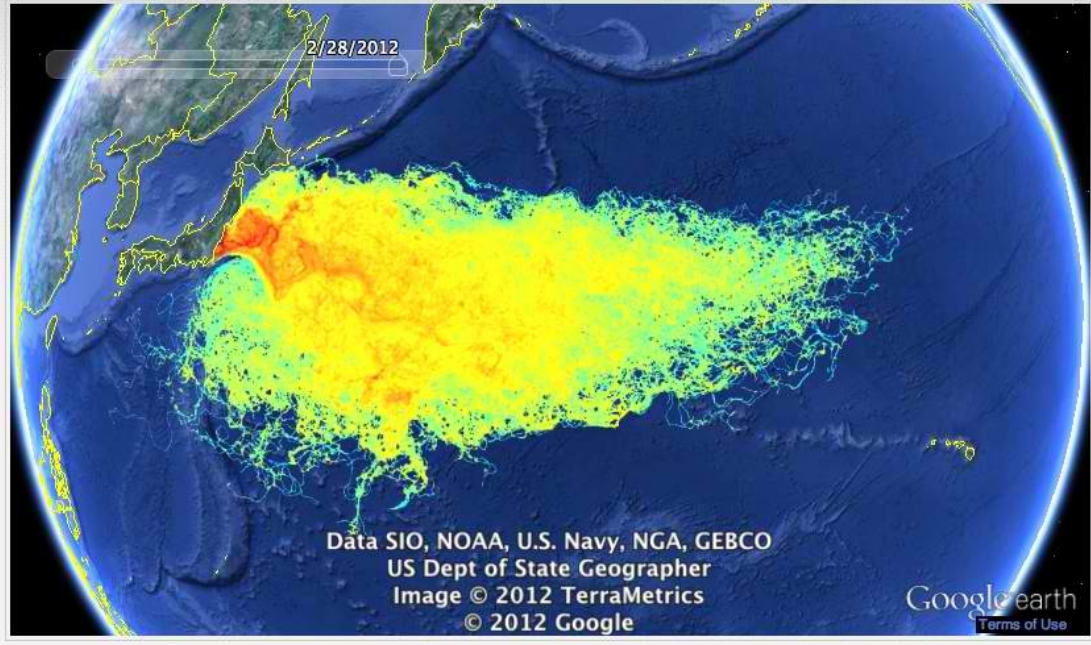


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— a handsome majority in the Upper House. Earlier this month, Tokyo Electric Power Co. said groundwater samples taken at the battered plant showed that levels of cesium-134 had shot up more than 110 times in a few days.

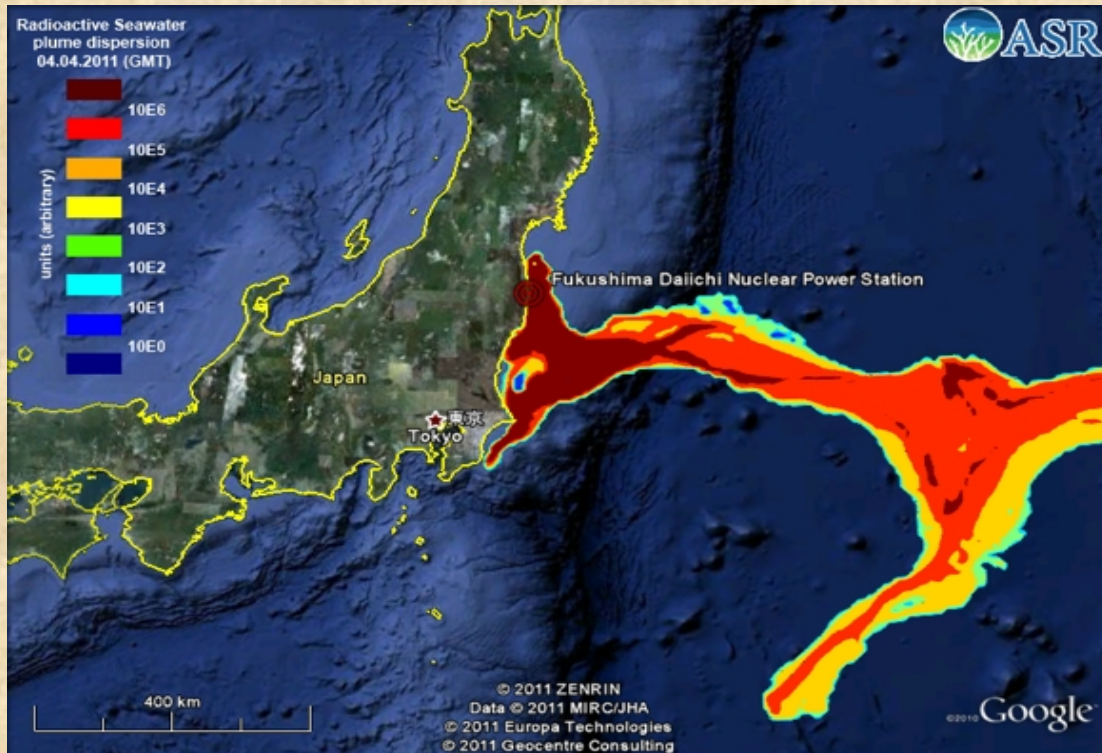
“But now we believe that contaminated water has flowed out to the sea,” a Tepco spokesman said Monday.

However, the spokesman insisted the impact of the radioactive water on the ocean would be limited. “Seawater data have shown no



Although unable to explain the increased readings, Tepco had nevertheless maintained

abnormal rise in the levels of radioactivity.” Tetsu Nozaki, chairman of Fukushima



the toxic groundwater was likely being contained, largely by concrete foundations and steel sheets.

Prefectural Federation of Fisheries Co-operative Associations, voiced deep concern.





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“It was quite shocking,” he told NHK. “(Tepco’s) explanation is totally different from the one in the past.”

Fishing around the Fukushima plant was halted shortly after the crisis, and production of beef, milk, mushrooms and vegetables was banned in surrounding areas, crippling the prefecture’s thriving fishing and agriculture industries.

Tepco, which is surviving thanks to a massive infusion of public funds, said it would step up efforts to reduce underground water by consolidating soil near its harbor.

Radioactive substances released by the reactor core meltdowns at the aging plant following the huge quake and tsunami of March 2011 have been leaking from damaged

buildings and mingling with the ground water, which usually flows out to sea.

Environmental experts warn that the festering radioactive sore could contaminate the food chain by tainting marine life and ultimately, the humans who eat it.

Tepco said earlier this year that a fish found with radiation more than 2,500 times the legal limit had been caught in a port on Fukushima No. 1’s premises. It also said last week that around 2,000 people who worked at the plant now face a heightened risk of thyroid cancer.

This is 10 times more than Tepco’s previous estimate for potential thyroid cancer victims and came after the beleaguered utility was told its figures were too conservative.

**Cold War nuclear weapons storage facility video now available**

Source: <http://www.lanl.gov/newsroom/news-releases/2013/July/07.23-top-secret-vault-declassified.php>

July 23, 2013—Down a remote canyon near Los Alamos National Laboratory lies a facility known as the “Tunnel Vault,” once one of the most secret and secure locations in the United States, it’s the original post-WWII nuclear

At the end of the tunnel is a large alcove room with a single bank vault door. Through that door is a vault built inside a vault with five storage areas, all protected with identical bank vault doors. All these features can be seen on



stockpile storage area. Located in Los Alamos canyon at Technical Area 41, the Tunnel Vault was built between 1948 and 1949. The facility has a formidable security perimeter, a hardened guard tower — complete with gun ports and bulletproof glass — and a series of gates and doors that lead to a 230-foot long concrete tunnel that goes straight into the canyon wall.

a video that tours the recently declassified, historically significant facility available on the Los Alamos National Laboratory YouTube channel.

The video also features commentary by Ellen McGehee, the Laboratory’s historic facilities manager, Alan Carr, Lab historian, and Glen McDuff, a weapons scientist who worked at various times in the





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facility and later operated a classified museum there.

As part of the Laboratory’s 70th anniversary “Signature Week” the Tunnel Vault will be one of the stops on two tours during the week of

nuclear material assembly for tests both in the Pacific and in Nevada.

“This facility had a long history during the cold war. So this was definitely a top secret, very secure location,” said McGehee.



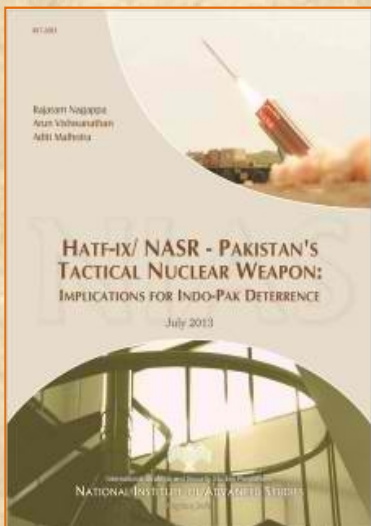
July 22, one tour will be open to working news media, and the other tour will be part of the Laboratory’s family celebration for employees and their family members.

Over the years the Tunnel Vault was also used as a nuclear material and nuclear fuel storage area, a weapons research and development laboratory, weapons components storage, and

About halfway down the tunnel is a side room that was used for early development of unclassified research that led to the discovery of the neutrino — work that later won a Nobel Prize in physics — a lab space ideal for the work because it’s buried 300-feet deep underground.

▶ See the very interesting video here:

[http://www.youtube.com/watch?v=dWA5Z32tiKM&feature=c4-overview&list=UUbWmiA\\_pHk9DE62BaSUFFRw](http://www.youtube.com/watch?v=dWA5Z32tiKM&feature=c4-overview&list=UUbWmiA_pHk9DE62BaSUFFRw)



**Pakistan’s Tactical Nuclear Weapons: Implications for Indo-Pak Deterrence**

**Authors:** Rajaram Nagappa, Arun Vishwanathan and Aditi Malhotra

**Source:** <http://issp.in/pakistans-hatf-ix-nasr-implications-for-indo-pak-deterrence/>

On April 19, 2011 Pakistan conducted the first test flight of Hatf-IX (NASR) missile. The Pakistani Inter-Services Public Relations (ISPR) described the missile as a ‘Short Range Surface to Surface Ballistic Missile’. Till date there have been three tests of the missile system on April 19, 2011, May 29, 2012 and February 11, 2013.

Following the Pakistani tests and claims of NASR being a nuclear capable missile, there has been a lot of analysis pointing to the dangers it poses for Indo-Pak deterrence. However, despite the large amount of literature which has come





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out following the NASR test in April 2011, not much attention has been directed at carrying out a holistic assessment of the tactical nuclear weapons issue. It is this crucial gap that that this report seeks to address.



The NASR warhead section has been estimated to have a cylindrical section which is 361 mm in diameter and 940 mm long with a conical portion which is 660 mm long. Thus, the important question is whether (a) Pakistan has a miniaturized weapon warhead which will fit into this dimension, (b) whether it has been tested and (c) in the absence of tests, how reliable is the weapon system. Most importantly, in the absence of demonstrated reliability, how confident will Pakistan be in fielding it?

Pakistan’s gambit of using NASR to signal a lowering of its nuclear threshold to counter any conventional military operation by India is likely to pose challenges for robustness of nuclear deterrence between Pakistan and India. An important question to ponder over and one that holds some importance for nuclear stability in the Indian sub-continent is whether NASR is leading Pakistan into a ‘commitment trap.’ It would be wise to guard against a situation where Pakistan would be forced to follow through just because of its past assertions.

The study shows that a weapon system like NASR has more disadvantages than advantages from all considerations ranging from damage potential to impact on deterrence stability.

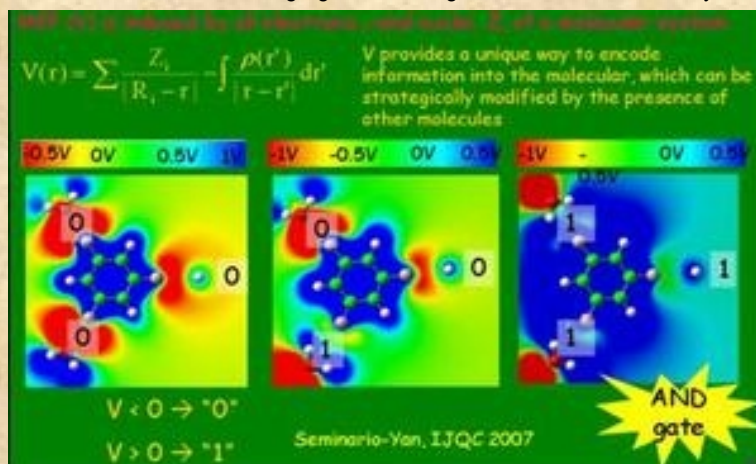
► **Read full report at:** [http://issp.in/wp-content/uploads/2013/07/R17-2013\\_NASR\\_Final.pdf](http://issp.in/wp-content/uploads/2013/07/R17-2013_NASR_Final.pdf)

**Molecule “scanner” uses terahertz radiation to identify single molecules**

Source: <http://www.homelandsecuritynewswire.com/dr20130807-molecule-scanner-uses-terahertz-radiation-to-identify-single-molecules>

Molecules could soon be “scanned” in a fashion similar to imaging screenings at

airports, thanks to a detector developed by University of Pittsburgh physicists.



A University of Pittsburgh release reports that the detector, featured in a recent issue of *Nano Letters*, a publication produced by the American Chemical Society, may have the ability chemically to identify single molecules using terahertz radiation — a range of light far below what the eye can detect. “Our invention allows lines to be





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‘written’ and ‘erased’ much in the manner that an Etch A Sketch toy operates,” said study coauthor Jeremy Levy, professor in the Department of Physics and Astronomy within the Kenneth P. Dietrich School of Arts and Sciences. “The only difference is that the smallest feature is a trillion times smaller than the children’s toy, able to create conductive lines as narrow as two nanometers.”

Terahertz radiation refers to a color range far beyond what the eye can see and is useful for identifying specific types of molecules. This type of radiation is generated and detected with the help of an ultrafast laser, a strobe light that turns on and off in less than thirty femtoseconds (a unit of time equal to 10-15 of a second). Terahertz imaging is commonly used in airport scanners, but has been hard to apply to individual molecules due to a lack of sources and detectors at those scales.

“We believe it would be possible to isolate and probe single nanostructures and even

molecules — performing ‘terahertz spectroscopy’ at the ultimate level of a single molecule,” said Levy. “Such resolution will be unprecedented and could be useful for fundamental studies as well as more practical applications.”

Levy and his team are currently performing spectroscopy of molecules and nanoparticles. In the future, they hope to work with a C60, a well-known molecule within the terahertz spectrum.

The oxide materials used for this research were provided by study coauthor Chang-Beom Eom, Theodore H. Geballe Professor and Harvey D. Spangler Distinguished Professor at the University of Wisconsin-Madison College of Engineering.

The research was supported by grants from the United States Air Force Office of Scientific Research and the National Science Foundation.

— *Read more in Yanjun Ma et al., “Broadband Terahertz Generation and Detection at 10 nm Scale,” Nano Letters 13, no. 6 (21 May 2013): 2884–88*

**Virtual control room helps nuclear operators, industry**

Source:[https://inlportal.inl.gov/portal/server.pt?open=514&objID=1555&mode=2&featurestory=DA\\_611103](https://inlportal.inl.gov/portal/server.pt?open=514&objID=1555&mode=2&featurestory=DA_611103)

Modernizing nuclear power plants to help extend their operating lifetimes is no small task. But the endeavor offers an opportunity to improve

nuclear control room that can test the safety and reliability of proposed technology replacements before they are implemented in commercial nuclear control rooms. The facility is now helping Duke Energy embark on an upgrade project for several of its nuclear plant control rooms.

This one-of-a-kind control room simulator is specifically designed to facilitate digital renovation of existing plants, which predominantly use analog systems. The INL lab also enables scientists to improve control-room designs by studying human interactions with

the instruments and responses to alarms. “The goal is to provide industry with a capability to understand and test how proposed changes to existing instrumentation and control systems



control-room design and layout. The Department of Energy’s new Human System Simulation Laboratory (HSSL) at Idaho National Laboratory is a full-scale virtual





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will affect their plants," said Richard Reister, manager of the Department of Energy's Light Water Reactor Sustainability (LWRS) Program in the Office of Nuclear Energy. "This will allow better design and digital upgrades with less risk of potential unforeseen problems." Development of the virtual control room technology was initially funded with Laboratory Directed Research & Development funding. After completion of the LDRD project, the DOE LWRS Program provided funding to continue development of this capability.

The project began in 2010 to support updating of control-room alarm systems. However, researchers quickly realized that full control-room modernization was necessary to achieve the highest safety goals. The HSSL lab can now extensively evaluate operator performance and safety risks of a new control-room interface before it is installed in an active plant.

INL's control-room simulator is a hybrid facility that mimics both digital and analog systems, which typically support physical controls such as valves, gauges, keyboards and touch screens.

The HSSL includes state-of-the-art glass-top touch-sensitive panels. These virtual controls are fully reconfigurable to duplicate control rooms of any operating nuclear reactor. The displays can reproduce hundreds of analog control boards, which real nuclear operator crews can interact with.

Design engineers observe these interactions and study human responses to normal and emergency situations in newly formatted control rooms. Such information can help enhance operator control and situational awareness.

The full-scale, 15-panel simulator was fully completed in March, though operator crews from HSSL's industry partners had begun running initial simulations with the technology in November.

"There is no other research facility in the world like this focused on control-room modernization," said Ron Boring, principal investigator for the Pilot Project on Control Room Modernization. "We're already developing prototypes that are demonstrating the benefits of new technologies at nuclear power plants. Modernizing these control rooms

is hugely exciting research that also fills an important need in industry." The HSSL is currently running three plant control models, with most development efforts focused on Shearon Harris Nuclear Plant in North Carolina, the first of many simulations for industry partner Duke Energy as the company begins digitizing its nuclear plants. The Electric Power Research Institute (EPRI) — which conducts research and development for the electric industry— is collaborating in HSSL's research.

"The HSSL provides the ability to rapidly develop prototype control-room modifications, get early feedback from control-room operators, and test new designs with realistic plant scenarios before the designs are built," said Joseph Naser, EPRI project manager and technical executive. "This will allow the designs to effectively and reliably meet the goals of the plant owner and will reduce the cost and time to implementation."

As the HSSL is used to gather data, the simulation results will be available for any company in the nuclear industry to use in control-room modernization, said Bruce Hallbert, an LWRS program manager.

The simulation lab team is currently working on prototype digital displays that would convey chemical balance, turbine control and other important plant information not captured on the current panels. The objective is to introduce information that can help human controllers maintain their situational awareness, particularly during emergencies.

"The goal of control room modernization is to replace aging analog technology," said Hallbert. "We want to enhance the functionality and safety of operating nuclear power plants by leveraging the capabilities of new digital technologies."

INL is one of the DOE's 10 multiprogram national laboratories. The laboratory performs work in each of DOE's strategic goal areas: energy, national security, science and environment. INL is the nation's leading center for nuclear energy research and development. Day-to-day management and operation of the laboratory is the responsibility of Battelle Energy Alliance.





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### More news from Fukushima

Source: <http://blogs.fas.org/sciencewonk/2013/08/more-news-from-fukushima/>

Recent reports from Japan have revealed that there is radioactive contamination in the



groundwater and that it's headed seawards. To keep it from flowing into the sea the Japanese have tried to stop it in its tracks – in response the water table is rising and the contaminated groundwater is rising towards the surface. Not only that, but contamination levels in the groundwater have gone up dramatically – by a factor of over 100 in some cases. The questions are whether or not these changes are expected, why they are happening, and what they portend – in particular, whether or not they bode ill for the Japanese and the environment around the reactor plants.

To answer the first question, none of these changes are really unexpected. We know that tons of water have been poured into the reactor plants for the last few years to try to keep what remains of the reactor cores cool. We also know that there was severe damage – enough to drain water from the cores in the first place. And remember that in the early days following the accident the basements of the reactor plants were filled with contaminated water. Unless every single leak has been plugged (which is almost certainly not the case) we can expect that contaminated cooling water will be continuing to leak from the reactor plant into

the basement and thence into the groundwater beneath the reactor plant. This might reflect an increase in the release of radionuclides from the reactor if, for example, there has been further damage opening another path for water to be released from the reactor plant. It could also reflect the dynamics of the local groundwater flow, or even changes in the local groundwater flow patterns. But I think it's safe to say that this is NOT the result of some sort of re-criticality – first, because it's implausible that the remnants of the reactor fuel can even achieve criticality again (think of all the design and precision engineering that goes into making a reactor that can achieve criticality by design, let alone an accidental start-up of the remnants of a ruined reactor core), and also because, if there was a miraculous criticality then the groundwater would also hold a number of short-lived radionuclides (e.g. I-131) that don't seem to be there.

It's also no surprise that groundwater levels seem to be rising towards the surface. While the notion of “underground rivers” is not quite accurate, water does flow through the interstices of the sediments of which soil is made. Near the ocean the water is most likely to be flowing towards the sea – if a barrier is put in its way then the groundwater will back up, just as it backs up behind a dam to form reservoirs and lakes. The only way to keep the groundwater from backing up and rising towards the surface is to pump it out at the same rate it's accumulating behind the barrier – the longer the barrier the more volume will have to be pumped out (and treated or stored since it's contaminated with radioactivity).

So the bottom line is that neither the increase in radioactivity concentrations nor the rising groundwater levels should be a surprise. But what about safety?

An easy answer is that this probably doesn't affect human safety since nobody is likely to be drinking the groundwater anywhere in the area. But that's a little too facile, so let's try to dig a little deeper.

One way to look at it is to look at a concept called the Allowable Limit for





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Intake (abbreviated ALI). The ALI is the amount of a radionuclide that, if inhaled or ingested, will give a person a radiation dose of 5 rem (50 mSv). The ALI for Sr-90 is 30  $\mu$ Ci (about 1 MBq) – don't worry too much about exactly what the units mean, they're various methods of determining how much radiation is emitted by a radioactive object. TEPCO has reported that the groundwater in this area now has about 0.056 MBq of Sr-90 and other beta-emitting radionuclides – if we assume that all of the radioactivity in the groundwater is from Sr-90 then drinking about 20 liters of groundwater would give one an uptake of 1 ALI, and a radiation dose of 5 rem (50 mSv) to the body. On average, we drink about 4 liters of water daily, so it would take 5 days to drink enough water to reach a dose of 5 rem, or about 1 rem (10 mSv) per day.

So taking this a little further, drinking this water for an entire year would expose a person to a dose of over 300 rem (3 Sv). This is a high exposure – more than is safe. Again, this assumes that all of the radioactivity is from Sr-90 – in reality there are other nuclides present, but even so this water should not be consumed. But for those living in the real world (i.e. not on the site and not drinking the groundwater), it looks as though the health effects will be minimal since the radiation dose outside of the immediate area is very low (this is consistent with the readings I got when I was in the area a month or so after the accident, and is also consistent with what we've seen in the Ukraine and Byelorussia in the aftermath of the Chernobyl accident).

It's also worth wondering about the impact on the environment. This one's a little harder to work through because it really depends on the exact levels of the various nuclides, the types of sediment they encounter underground and in the harbor, the rate of groundwater flow into the sea, and the characteristics of the flow of seawater from the harbor into the ocean (and onwards).

Consider the importance of the sediments alone (and here I should confess that, until I took graduate classes in soil mineralogy and clay mineralogy I thought there was likely nothing more boring than studying sediments – I was wrong). Some types of clay minerals latch onto some radionuclides and never let them go – radioactivity never spread all that far from the Kursk or from the sunken American subs (Thresher and Scorpion) while other clays

don't hold onto nearly as much; while some chemical elements are much more likely to be immobilized than others. So without knowing these details about the nuclides and the sediments we really can't make more than an educated guess as to the mobility of these nuclides in the environment – without knowing that, we also can't really determine the exact environmental effects. But we can think of some extremes and figure that reality is somewhere in between.

One extreme would be to assume that all of the radioactivity stays in the local area – that it isn't very environmentally mobile. In this case, radionuclide concentrations in the immediate vicinity of the reactor site would be fairly high – possibly high enough to harm the local organisms – but radiation dose further afield would be virtually nil.

The other extreme would be that the radioactivity disperses into the open ocean and doesn't stick around the local area. In this case we'd see radioactivity spreading far and wide, but nowhere would it be concentrated to level that could cause harm. And this is actually not impossible – airborne radionuclides from Fukushima (and Chernobyl too, for that matter) were detected throughout the Northern Hemisphere, but in such trace amounts that they posed no harm to anyone. Part of the reason for this is that our radioactivity detection technologies are so advanced that we can detect the natural radioactivity in the human body (I have a detector that can get noticeable counts from a pack of cigarettes or from a bunch of bananas) – but at such low levels that there is no risk. By analogy, I can measure the speed of a snail inching across the floor and I can calculate its kinetic energy – but the snail is far from deadly.

Reality is likely somewhere between these extremes. If we think about the Chernobyl accident we can see some similarities. Trace amounts of radioactivity dispersed into the atmosphere and had a global reach, even if there was no discernable health or environmental impact outside the immediate vicinity of Chernobyl. Similarly, it is not unreasonable to expect that there may well be local environmental effects – likely confined to the vicinity of the reactors – but the impact is unlikely to be global.

So there's mixed news here. First is that the radiological conditions – at least with respect to radioactivity in





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the groundwater – seem to have worsened recently. On the other hand, this worsening can be explained without resorting to extraordinary explanations (such as the reactor somehow achieving criticality). The concentrations of radionuclides in the groundwater could be dangerous to people who drank only the groundwater but, given the realities of the situation (e.g. that the area has been evacuated), it's not likely that anyone will be drinking the groundwater. And, while the exact environmental consequences remain to be seen, the worst case would be localized

damage to the harbor ecosystem, but ill effects under any scenario are unlikely to extend outside the immediate area of the reactor plants.

The bottom line is that this was (obviously) a serious accident and it's very possible that there will be environmental consequences. But we have to be realistic and acknowledge that these consequences – whatever they are – will be limited in scope and extent. Fukushima was a bad accident – let's not let our misconceptions make it appear any worse than it actually was.

**Nuclear Reactors in U.S. Seen at Risk of Terrorist Attack**

Source: <http://www.bloomberg.com/news/2013-08-15/nuclear-reactors-in-u-s-seen-at-risk-to-terrorist-attack.html>

Commercial U.S. nuclear reactors remain vulnerable to terrorist threats more than a decade after the 2001 attacks spurred added safety measures, according to an independent study prepared for the Defense Department.

"This leaves private-sector facilities less protected than government facilities that face similar risks of theft of fissile material or radiological sabotage, which makes no sense," according to the report.



After terrorists flew four commercial airliners into buildings in New York and Washington, and a Pennsylvania field on Sept. 11, 2001, the U.S. Nuclear Regulatory Commission required all reactor-owners to bolster security. The measures included increased patrols, vehicle checks and additional barriers to prevent intrusion. Operators also had to deal with assaults from the air and by water,

The combined public and private security provided at the power plants "is inadequate to defend against a maximum, credible, non-state adversary," the Nuclear Proliferation Prevention Project at the University of Texas at Austin said in the report released today.

according to the NRC website.

The combined public and private security provided at nuclear power plants "is inadequate to defend against a maximum, credible, non-state adversary," the Nuclear Proliferation Prevention Project at the University of Texas at Austin said in a report. Photographer: Michael Williamson/The Washington Post via Getty Images

**'Adequately Protected'**

"The report contains no new information or insight" and is a "rehash of arguments from a decade ago" when the NRC was developing post-Sept. 11 rules, David McIntyre, a spokesman, said in an e-mail. "The NRC has strengthened security requirements for commercial nuclear power plants and remains confident that these important facilities are adequately protected."

The steps taken by the NRC still aren't enough to protect against a





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major terrorist attack because they deal only with threats that a plant is designed to handle, known as the “design-basis threat,” according to the Texas study.

“None of the 104 U.S. power reactors is required to protect against a 9/11-style attack,” Alan Kuperman, the project’s coordinator and study co-author, said on a conference call with reporters.

While the report didn’t mention specific reactors, a statement accompanying the study listed units in coastal areas that it said are vulnerable to attacks by boat. They included PG&E Corp. (PCG)’s Diablo Canyon plant in California, Dominion Resources (D) Inc.’s Surry facility in Virginia and Entergy Corp. (ETR)’s Indian Point units north of New York City.

### Vulnerable Plants

Kuperman said the study for the Pentagon was generic, focusing on the adequacy of design-basis threats. The individual reactors were added in the statement to make it more “user friendly” when it released to the public.

Both the NRC and the Nuclear Energy Institute, a Washington-based industry group for reactor owners, disputed that those plants are more vulnerable than others.

All commercial reactors in the U.S. protect against the same water-borne threats, David Kline, NEI’s director for nuclear security, said in an interview. The threat requirement for reactors is based on intelligence and reviewed periodically with input from government officials, he said.

“We understand that this report was developed by academia,” Kline said. “I’m always

concerned when folks have an unclassified report and claim to have all the answers in it.” Classified documents contain more detailed information about threats, he said.

### Same Standards

The three agencies responsible for oversight of the nation’s nuclear facilities -- the NRC, and Energy and Defense departments -- should have the same standards to guard against attacks, according to the Texas study.

Risks include the possibility that an intruder could deactivate a nuclear unit’s security systems, drain the cooling pool to expose radioactive waste, or use rocket-propelled grenades to overcome a facility’s defenses, according to the study. It also said terrorists could fly an airplane or drive an explosive-laden boat into a reactor.

“The fact that future power plant designs must protect against aircraft attacks is an acknowledgment by the NRC that the threat is credible,” the report said. The threat should be included in the design requirements for existing reactors as well as new units, it said.

The NRC has said on its website that the best approach to dealing with aircraft threats is by strengthening airport and airline security and deployment of anti-aircraft weapons would be a decision to be made by the Defense Department.

“Since 9/11, it’s much harder to take advantage of a commercial airliner in a hijacking,” said NEI’s Kline. The group doesn’t believe the impact of a large plane would trigger a large radioactive release, he said.

### ► Read full report at:

<http://blogs.utexas.edu/nppp/files/2013/08/NPPP-working-paper-1-2013-Aug-15.pdf>

### Radiation detection to go

Source: [https://share.sandia.gov/news/resources/news\\_releases/mrdis\\_radiation/#.Ug6Drqzp\\_wN](https://share.sandia.gov/news/resources/news_releases/mrdis_radiation/#.Ug6Drqzp_wN)

A Sandia National Laboratories team completed acceptance testing on an enormous mobile scanner that makes smuggling radiological materials more difficult, the eighth such unit that Sandia has deployed worldwide. The Mobile Radiation Detection and Identification System (MRDIS) enables scanning of containers that are in transit from one cargo ship to another.

Typical radiation detectors are fixed at port entrances and exits, so they aren’t able to scan transshipped containers, said Greg Stihel of Sandia’s Systems & Mission Assurance Department. This makes transshipment containers an enticing option for those who might want to smuggle radioactive materials into a country for terrorist activities, such as making dirty bombs, he said.





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“In 2006, National Nuclear Security Administration [NNSA] recognized the need to also scan cargo that is taken off a ship and, in a short period of time, put on a second ship,”

Engineers then created a detailed set of requirements for subsequent models, allowing the project to move forward quickly. The work was done in partnership with Pacific



Stihel said. Port security is a major international concern, but port operators and shippers require a balance between security and shipment delays that hurt their bottom line. “If the system creates time delays, that costs shippers and port operators money, and the detectors won’t get used,” Stihel said. Directed by NNSA’s Second Line of Defense (SLD) program, Sandia engineers developed the idea for MRDIS to meet the need for a technology that could scan transshipped containers quickly. Two MRDIS prototypes were developed in 2006 and were field tested in Oman. Engineers analyzed how accurately and quickly MRDIS scanned cargo and worked with port operators to refine the process. Inspectors can move MRDIS to active quays, so containers can pass through the MRDIS on the way to another vessel in the port. After the prototypes proved their worth, NNSA ordered 12 MRDISes, which Stihel termed a “tremendous” investment in the idea. Two years later, the first production unit of the second-generation MRDIS was complete.

Northwest National Laboratory (PNNL) and the Cincinnati firm DRS Technologies.

**Not like driving a tractor trailer**

To date, eight MRDIS units have been deployed worldwide. The first set of four went to Panama in November 2012. The four in Oman arrived last summer and completed final acceptance testing in late March. Stihel said driving MRDIS “feels strange because it’s so big, and because the operator sits sideways, facing the trucks going through the center. The MRDIS is big enough for a truck carrying shipping containers to pass through, so it’s not like driving just a tractor trailer truck.” Rodney Wilson, who directs Sandia’s Nonproliferation and Cooperative Threat Reduction Center, observed field testing and drove the MRDIS during a visit to Oman in late March. “It is not as intuitive as you think. Imagine being in the back seat of your car, on the passenger side, facing in, and trying to drive the car





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using joy sticks to turn and go forward and back, all while staring at a computer screen. Oh, and you are also 15 feet off the ground,” Wilson said.

**Use at ‘pinch points’**

Nearly 90 percent of goods travel by shipping container, making them an enticing target. (Photo by Greg Stihel) Click on the thumbnail for a high-resolution image. Stihel said each MRDIS can work independently or as part of a team, depending on the port’s needs. Each MRDIS can also feed data into a central system or collect data on its own. The ports in Oman and Panama are using three MRDISes as primary scanners, with a fourth MRDIS that has more

sophisticated detection equipment serving as a secondary scanner.

MRDIS will begin scanning cargo at two international airports by next year, he said. MRDIS-like platforms could be used at any location with “pinch points” through which traffic passes.

The work was funded by NNSA’s International Material Protection & Cooperation Office under SLD, which installs radiation detection equipment at land border crossings, airports, seaports and international checkpoints worldwide.

Nearly 90 percent of imported and exported goods travel the globe in shipping containers. Roughly 500 million containers travel the sea each year.

**Long-term radiation effects: Chernobyl’s lessons for Fukushima**

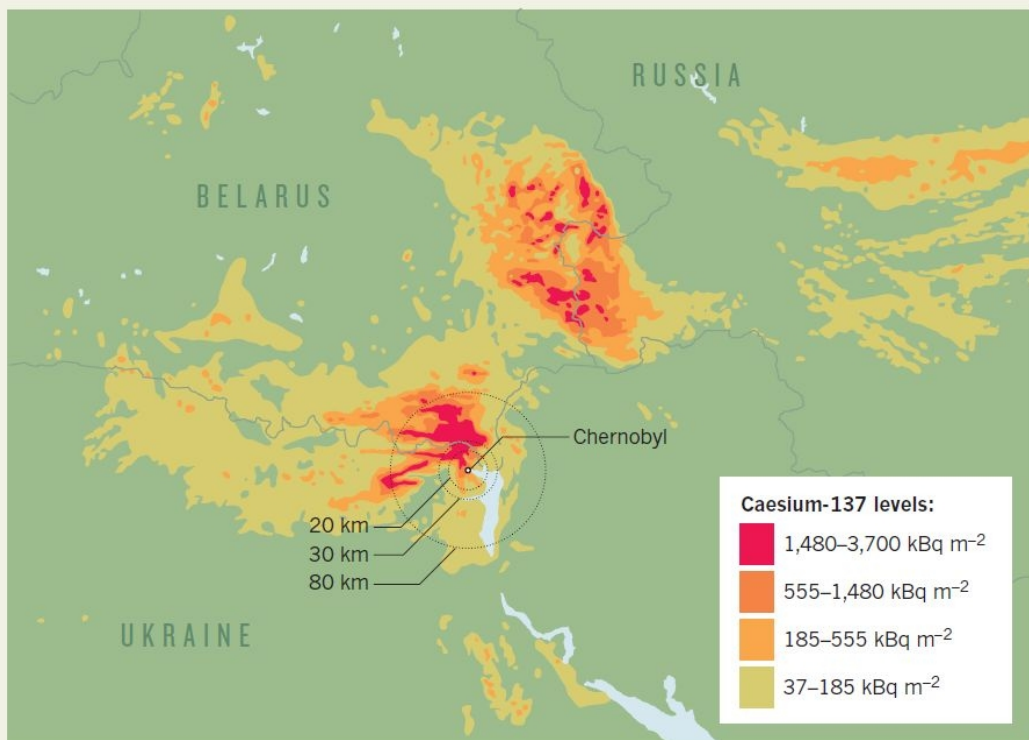
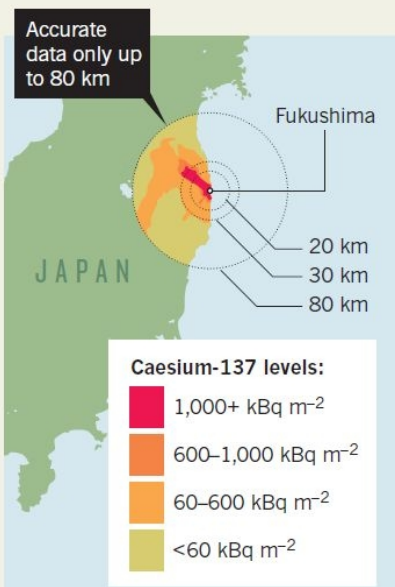
Source: <http://www.homelandsecuritynewswire.com/dr20130826-longterm-radiation-effects-chernobyl-lessons-for-fukushima>

The Fukushima Daiichi nuclear disaster spread

of the Université Paris-Sud, are bringing a new

**FALLOUT COMPARISONS**

New data from Fukushima show caesium-137 levels approaching those of Chernobyl — but over a much smaller area.



Total Fukushima caesium-137 release:  $1.5 \times 10^{16}$  Bq  
 Total Chernobyl caesium-137 release:  $8.5 \times 10^{16}$  Bq

significant radioactive contamination over more than 3,500 square miles of the Japanese mainland in the spring of 2011. Now several recently published studies of Chernobyl, directed by Timothy Mousseau of the University of South Carolina and Anders Møller

focus on just how extensive the long-term effects on Japanese wildlife might be. A University of South Carolina release reports that their work underscores the idea that, in the wake of the Chernobyl catastrophe in





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1986, there have been many lost opportunities to better understand the effects of radiation on life, particularly in nature rather than the laboratory. The researchers fear that the history of lost opportunities is largely being

the economic recession that followed the breakup of the Soviet Union.”

The release notes that a large body of this work finally came to the attention of Western scientists in 2009 with the publication of

Fukushima



Chernobyl



replayed in Fukushima.

Given the widespread interest in using nuclear power as a means of generating energy with minimal carbon emissions, the authors believe policy-makers — and not just in Japan — need better to fund independent scientists wanting to study the after-effects of Fukushima.

Mousseau and Møller have with their collaborators just published three studies detailing the effects of ionizing radiation on pine trees and birds in the Chernobyl Exclusion Zone. “When you look for these effects, you find them,” said Mousseau, a biologist in USC’s College of Arts and Sciences.

In the journal *Mutation Research*, they showed that birds in Chernobyl had high frequencies of albino feathering and tumors. In *PLoS ONE*, they demonstrated that birds there had significant rates of cataracts, which likely impacted their fitness in the wild. In the journal *Trees*, they showed that tree growth was suppressed by radiation near Chernobyl, particularly in smaller trees, even decades after the original accident.

Given previous work by scientists in former Soviet bloc nations, the results were not unexpected to Mousseau and Møller. “There’s extensive literature from Eastern Europe about the effects of the release of radionuclides in Chernobyl,” Mousseau said. “Unfortunately, very little of it was translated into English, and many of the papers — which were printed on paper, not centrally stored, and never digitized — became very hard to find because many of the publishers went belly up in the 1990s with

“Chernobyl: Consequences of the Catastrophe for People and the Environment” as a monograph in the *Annals of the New York Academy of Sciences*.

“That publication was a response to the World Health Organization’s Chernobyl Forum in 2006, which explicitly states that they found that the plant and animal communities in Chernobyl were doing incredibly well and have come back better than ever, because of the absence of people,” Mousseau said. “But when you dug into the Chernobyl Forum report to find out what they based this conclusion on, there were no scientific papers to support it.”

The Eastern European compilation published in 2009 ran contrary to that positive assessment, but it lacked elements of scientific rigor in places. “It is the best summary of the papers that have been generated in Eastern Europe, and it’s an important body of work for understanding Chernobyl,” Mousseau said. “But there were some problems — for example, with the lack of statistical treatment. We’re using these studies as a bit of a guide, but trying to do them in a thorough way, better than anyone’s done them before.

“The uniform theme we find from these papers is that, when you look carefully, in a quantitative way, you see numerous biological impacts of low doses of radiation. Not just abundance of animals, but tumors, cataracts, growth suppression.”

As Mousseau and Møller detail in an editorial in the *Journal of Health & Pollution*, the opportunities to study these sorts of effects in nature are





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once again slipping away, much as with Chernobyl. “The funding for independent scientists to do basic research in contaminated

areas in Fukushima is just not there,” Mousseau said.

— Read more in Timothy Alexander Mousseau and Anders Pape Møller, “Elevated Frequency of Cataracts in Birds from Chernobyl,” *PLoS ONE* 8, no. 7 (30 July 2013): e66939 (doi:10.1371/journal.pone.0066939);

Timothy A. Mousseau et al., “Tree rings reveal extent of exposure to ionizing radiation in Scots pine *Pinus sylvestris*,” *Trees* (June 2013);

Mousseau and Møller, “Introduction to ‘A Critical Analysis of the Concept of an “Effective Dose” of Radiation’,” *Journal of Health and Pollution* 3, no. 5 (June 2013);

Møller and Mousseau, “Reduced abundance of raptors in radioactively contaminated areas near Chernobyl,” *Journal of Ornithology* 150, no. 1 (January 2009): 239-246;

Ismael Galván, Timothy A. Mousseau, and Anders P. Møller, “Bird population declines due to radiation exposure at Chernobyl are stronger in species with pheomelanin-based coloration” *Oecologia* 165, no. 4 (April 2011): 827-35.

