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# CIA: Mossad agent, Rafi Eitan, “obtained” enriched uranium from the U.S. to produce Israel’s nuclear bomb

Source: http://i-hls.com/2013/04/cia-mossad-agent-rafi-eitan-obtained-enriched-uranium-from-the-u-s-to-produce-israels-nuclear-bomb/

**FBI and CIA Documents claim: Israel has achieved the ability to produce a nuclear bomb after receiving approximately 260 kilograms of enriched uranium from the NUMEC plants, owned by the Jewish-American Zalman Shapiro. According to his testimony in 1981, Karl Dukat, who was Deputy Director of the Central Intelligence Agency stated: “when Richard Helms, CIA director, passed on the evaluation of this important intelligence to President Lyndon Johnson, the President told Helms: Do not tell anyone what you reported to me, not to Dean Rusk (then Secretary of State) or Bob McNamara (then Secretary of Defense). Contacts at  NUMEC at the time were Rafi Eitan (then head of the Bureau of Scientific Relations) and Avraham Shalom Bendor, later head of the Shin Bet.”**

Israel’s sophisticated and daring journey towards the materialization of its plans to construct a nuclear defense option was conducted by teams of senior information gathering officers, representing Israeli intelligence institutions, together with ‘Made in Israel’ scientists who knew the secrets of nuclear research. In the manner of keeping great secrets of this sort, especially within a ‘kingdom of secrets’ like Israel, some information was leaked resulting in delays or sometimes even preventing Israel and its determination to implement this top strategic goal. Such leaks have revealed, the nature, methods, and even the names of “war heroes” some of whom are still alive. One of those quiet heroes was Rafael (‘Rafi smelly ‘) Eitan who for many years of his life was involved in acts that secrecy seemed to fit him nicely. Rafi Eitan’s name is linked, by the general public, to the name of the Jonathan Pollard affair, but in fact it was not the first ‘espionage’ affair associated with his name. Rafi Eitan was exposed in the early sixties, in the context of Israel’s nuclear option, in an event investigated for years by the FBI and which later became known as “The NUMEC Case” (NUMEC – Nuclear Materials and Equipment) (1) and its Jewish owner Zalman Shapiro.

Zalman Shapiro

Who was this Zalman Shapiro and what was the mystery that surrounded Israel’s relations with his factory in Pennsylvania which was engaged in the processing of nuclear materials?

Zalman Shapiro was born in 1921 in Ohio, to a family of an Orthodox rabbi who came from Lithuania. Like many of the Jews in his generation whose minds had learned to deal with Talmudic arguments  from infancy, he was drawn to the sciences. He was accepted to Johns Hopkins University, the first and most prestigious research center in the U.S., where he completed his master’s degree and won a prestigious scholarship from the Standrd Oil Company. That scholarship enabled him to finance his studies until he received his doctorate in chemistry in 1948 at the age of 27.  The atmosphere of the revival of the Jewish people returning to their historical homeland caused Zalman to become active in the Zionist Organization of America, and to join the Technion Society.

As a Brilliant young scientist Zalman quickly found a job at Westinghouse which specialized, in those days, in the global science front – establishing nuclear power reactors. With his outstanding talents and scientific understanding young Zalman Shapiro  was promoted and brought to the attention of major scientists in the U.S. in those days. He joined the staff of Westinghouse and was engaged in developing the nuclear reactor for the first United States atomic submarine  the ‘Nautilus’. The head of the team of scientists he worked with was Professor Alvin Rdkovsky, also Jewish, and who later made ​​aliyah and joined the nuclear research activities in  Ben – Gurion and Tel – Aviv Universities.

The Entrepreneurial nature of Zalman Shapiro did not allow him to settle for the status of an employee, no matter how senior. Zalman was convinced that the right way to succeed in life was to realize the American dream on his own. In 1957 Zalman established a private company focusing on his specialization in chemical production of uranium oxide for fuel for commercial nuclear power reactors in the United States which were flourishing in those days like mushrooms after the rain. The Factory was founded and operated near the town of Apollo, Pennsylvania.

During those first days of the nuclear era, the control of American nuclear fuel produced by atomic power stations was very loose. The Inspection system in the new field was in its infancy stage and was based mainly on routine testing. For this reason, it seems, only in 1962 were NUMEC’s ‘discrepancies’ discovered, discrepancies between the quantity of nuclear material produced and recorded sales records. Audit authorities initially estimated that the discrepancy was only due to ‘managerial negligence’, but under further and more accurate and revealing examination, conducted by the Federal Atomic Energy Commission, ‘very suspicious findings’ were found.

It was revealed that a gap existed between production and sales with at least 50 kg of enriched uranium having disappeared, uranium suitable for generating electricity at nuclear power plants and nuclear weapons. At this stage the task of an investigation was transferred to FBI investigators. Primary suspicion for the ‘disappearance’ of the nuclear materials was directed towards Israel, with whom Shapiro had a unique relationship. During a further examination of the factual data, the researchers revealed that the shortfall was actually double the amount, about 100 Kgs. Shapiro argued during the investigation that the missing uranium was accidentally buried in the waste pits of the plant. The researchers did not believe the claim. After digging in the  waste pit it was revealed that the pit contained only 5 kg of uranium. NUMEC experts then raised a new explanation arguing that ” the big gap was due to the unique manufacturing process practiced at the plant and it was very likely that most of the missing material was lost in this process.”

The Atomic Energy Commission investigators who were experts in their fields  didn’t believe this strange argument. “In order to lose such a large quantity of nuclear material during the production process” the team leader explained to his colleagues with a grin, “NUMEC would have had  to work 24 hours a day from the American Revolutionary War until the present. However NUMEC has only worked for a few years. Bullshit stories. I am convinced that the missing material was transferred to countries, such as France and Israel, countries that NUMEC had contact with”.

Despite the lack of hard evidence, more than a few scholars from various federal agencies were convinced, according to foreign sources, that the enriched uranium reached Israel from the NUMEC plants and, according to foreign reports, Israel used them to produce nuclear weapons. According to his testimony in a televised interview on ABC tv in 1981, Karl Dukat, who was Deputy Director of the Central Intelligence Agency stated: “All of us in the CIA agreed that in all likelihood, the nuclear materials that NUMEC secretly transferred to Israel were used by Israel to produce nuclear weapons. When Richard Helms, CIA director, passed the evaluation of this important intelligence to President Lyndon Johnson, the President told Helms: Do not tell anyone what you reported to me, not to Dean Rusk (then Secretary of State) or Bob McNamara (then Secretary of Defense).” Ducat said on a different occasion that during a conversation he had with Helms he understood that Johnson ordered him “to stop handling the affair”.

If Johnson gave orders to “let it go” or not, there’s no solid information. But one fact is undisputed. U.S. investigative authorities did not let go of the subject. Following the findings of the investigations, the Attorney General of the United States ordered the use of ‘electronic surveillance’ for Zalman Shapiro, including field-tracking his movements and personal encounters. During ‘This watch’, nowadays known as ‘bugging’, FBI agents discovered evidence which they defined as ‘astonishing’ concerning Shapiro’s connections with ‘agents’ of the Israeli intelligence services.

Who were these ‘agents’ who were ‘connected’ to Zalman Shapiro and what were his relations with Israel?

Many researchers dug into this affair for years hoping to find answers to these concerning questions. It was only following the disclosure of confidential FBI documents released for publication a few years ago, that it appears that by the end of 1968 Shapiro served as a sales agent for ‘the Israeli defense establishment’ in the U.S.. The Documents also reveal the following information about Shapiro’s ties with Israel and its representatives:

• Using Shapiro’s ties with Israel’s Atomic Energy Commission, NUMEC was an equal partner with Israel in a company name **Isorad** (Isotopes and Radiation Enterprises) (2).

• NUMEC  employed an Israeli citizen named Bernard (or Baruch) Sinai, as an expert in metals (Metallurgy).

• Ephraim Lahav, a scientific advisor at the Israeli Embassy in Washington, visited the factory and  NUMEC plants several times in the mid-sixties.

• Four other Israelis visited NUMEC in ’68, met with Shapiro and held conversations with him on “issues related to the development of nuclear products.” The Four Israelis were: Abraham Hermoni, Ephraim Bagon, Abraham Bendor and Raphael Eitan. FBI Documents, relying on reports from NUMEC to the Atomic Energy Commission, clarified who they were: Hermoni is a “scientific advisor” at the Israeli Embassy in Washington; Bagon is the “group head” of the electronics department In the Israeli defense; Bendor worked for the department of electronics too, while Eitan was defined as a “chemist” in the defense establishment. The documents tell more: Hermoni, a “consultant” at the embassy from 1968 until 1972, was appointed to a senior position at Rafael (Armament Development Authority) when he returned to Israel.

Avraham (Avrum) Shalom Bendor

Certain information about the essence of these Israelis has revealed that the renowned journalist William Safire, in a column published in September 1987, called Bendor and Eitan “legendary figures in the Israeli espionage world”. More specific definitions have been given in the “Book of Spies – The Encyclopedia of Espionage” written by Norman Folmar and Thomas Allen and which stated that from 1981 to 1986 Bendor, also known as Avraham (Avrum) Shalom, was the head of the Israeli security service, known as Shin-Bet”.

Rafi Eitan

Who is Rafael Eitan? The authors of “The Book of Spies” wrote that he dealt with  the management of secret operations for the Israeli MOSSAD, and participated along with Bendor, in the kidnapping of Adolf Eichmann from Buenos Aires, and was also involved in the Pollard case.

The goal of the Israelis visit to the NUMEC factories was detailed in a book by Andrew and Leslie Cockburn, and entitled ‘Dangerous Liaisons.’ They wrote about Eitan in the following description. “When visiting the factory of NUMEC in Apollo, Eitan worked with them as a MOSSAD agent on a special mission on behalf of a covert intelligence agency, founded in 1950. His immediate task then was “to obtain nuclear technology by any means”.

Shortly after the visit of the Israeli agents, the news that NUMEC was missing 587 pounds (266 kg) of highly enriched uranium adequate for use in nuclear weapons came to the attention of the U.S. Atomic Energy Commission. The Exact amount missing remains the subject of discussion until this day. One way or another the amount does not exceed 587 pounds (266 kg) ‘at the most’ but ‘not less than’ 132 pounds (60 kg).

Despite the fact that all investigations have failed to disclose substantial evidence, FBI investigators decided not to let go of the mystery and passed their findings on to the Central Intelligence Agency (CIA). The General suspicion following the findings of the investigation and NUMEC wiretaps crystallized and resulted in an official inquiry in 1968. That is when the investigation was extended out of the borders of the United States as well.

Undercover CIA secret agents were sent to Israel to check ‘what was really going on in  Dimona’. The agents were not allowed to visit the reactor but they had some success about which they alluded to in 1978 in an article appearing in Newsweek: “Using sophisticated methods of technology, the Central Intelligence Agency found indications for the use of enriched uranium in Dimona The path of using enriched uranium is leading to the manufacturing of nuclear weapons”.

The investigation of NUMEC, including the investigation of Shapiro, continued for a decade, but has only succeeded in raising the estimates of the amount of radiation as well as additional circumstantial questions. Convincing evidence has not been discovered even so many years later. But as it goes in a large democracy like the United States, no legal action can be taken without proof.

Zalman Shapiro never revealed the truth behind the mystery and even refused to address questions put to him by the U.S. media. Nevertheless, in a statement to official investigators, Shapiro denied all of the rumors of the NUMEC affair. “I declare clearly,” Shapiro said in his testimony before a Senate committee in 1978, “I never took part in any theft or transfer of nuclear materials to Israel and I have no idea why these repeated stories appear”.

**Conclusion**

Although no charges were filed in the case, J.Edgar Hoover, the head of the Federal Bureau of Investigation (FBI) in those days,  decided to deny Shapiro of the high security classification he once held. The American Atomic Energy Commission imposed a fine of $ 1.1 million on Shapiro’s company for the inexplicable loss of uranium. Shapiro regarded as a suspect, despite the lack of proof against him, sold NUMEC to a company called Atlantic Lichfield.  Shapiro continued to use his unique and extensive knowledge, returning to his nuclear roots as a senior executive at Westinghouse.

**Notes**

(1)    Materials in connection with investigation of NUMEC rely on the information site: Secret CIA / FBI files of NUMEC nuclear diversions to Israel

(2)   Isorad registered in Israel as a government company whose address is in Yavne. Business: production and commercialization of the Soreq Nuclear Research Center developments. Among the members of the Board of Directors of the Company (as at Update 31/12/2008) is the chemist Dr. Gabriella Gafni, once Israeli representative for the International Atomic Energy Agency, Nina Admoni – Nahum Admoni’s wife (Nahum Admoni who was head of Mossad (1982-89)) and Arie Livne, head of the witness protection team at the Homeland Security office. It is not clear what business the representative of the Witness Protection Authority shares with the company engaged in the commercialization developments of the Nahal Sorek reactor.

(3)   In the biographical-encyclopedic information “Wikipedia”, regarding the head of the “Shin Bet”, Mr.  Avraham Shalom, it is noted that his full name is Avraham Shalom Bendor.

(4)   The Scientific Relations Bureau (LKM) was an Israeli intelligence body operating within the Ministry of Defense between 1957 to 1986. The Bureau was established, as indicated in “Wikipedia”, to secure the Nuclear Research Center (NRC), and to obtain sensitive technologies that one could not get freely. LKM evolved over the years to become an intelligence agency, along side with Mossad and “Shin Bet”. The beginning of LKM was by resolution of the Israeli government in the early fifties to achieve nuclear capability. LM was closed following the exposure of Jonathan Pollard who spied on its behalf in the United States. During its operational years, LKM was considered the most secret intelligence body and the most mysterious one.

# Özal poisoned with 4 substances: claim

Source:http://www.hurriyetdailynews.com/ozal-poisoned-with-4-substances-claim.aspx?pageID=238 &nid=35383

# Former Turkish President Turgut ÖzalInitial results of the forensic investigation indicate that four different types of poison have been found on the body of former Turkish President Turgut Özal, daily Zaman reported on Nov. 24.

# The poisons have been identified as radioactive chemicals Cadmium, Americium, Polonium and DDT, which had formerly been used as an insect powder.

# It has been claimed that Özal's body was first weakened by radioactive chemicals before he was assassinated with DDT.

# As part of the Ankara Prosecution Office's investigation into Özal's death, his body was exhumed from his grave earlier this year in order for samples to be collected for the investigation.

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| Prosecutors investigating the death of former Turkish President Turgut Özal have interrogated former General Levent Ersöz, on the grounds that he was complicit in murder, Doğan news agency reported April 2 (2013). Ersöz, who is also a suspect in the Ergenekon coup plot case, was interrogated for three hours, during which he denied all accusations.In an autopsy last December, Turkey’s Forensic Medicine Institute (ATK) did not find any evidence that Özal was poisoned, however the Ankara Chief Prosecution Office said the investigation would resume with the help of other findings. |

# Hartlepool nuclear power plant fire triggers emergency response

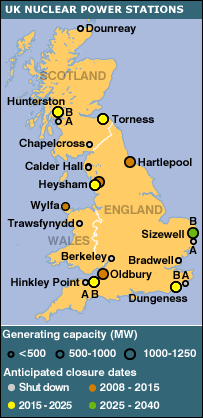
Source: http://www.guardian.co.uk/environment/2013/apr/21/hartlepool-nuclear-power-plant-fire

A fire at a nuclear power plant triggered a major response by emergency services after smoke was seen billowing into the air.

Police and fire crews were called to Hartlepool power station at about 6.30pm on Saturday after a blaze broke out while a turbine was being reactivated.

The fire caused smoke to billow from the plant but Cleveland police said it was drifting away from nearby homes.

Firefighters extinguished the blaze but remained on site as a precaution. No one was injured.

A statement from the force said: "During incidents such as this, there are several procedures that take place including the venting of steam generators. This particular process causes noise, which residents of nearby areas such as Seaton Carew may hear.

"There is smoke billowing as a result of the fire, but it is currently heading in a direction that does not cause any implications for members of the public."

EDF Energy, which runs the facility, confirmed a small fire was detected in the turbine hall of unit 2 at Hartlepool power station.

A spokesman added: "The fire was quickly brought under control and any residual smouldering extinguished at 7.53pm.

"There were no injuries as a result of this incident and there is no threat to the public or staff.

"Unit 1 at the power station continues to operate normally."

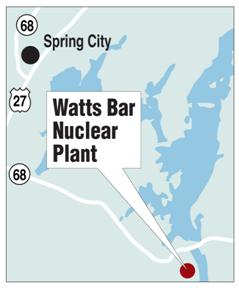
# Watts Bar Nuclear Plant intruder, shooting under federal probe

**By Pam Sohn**

Source:http://www.timesfreepress.com/news/2013/apr/22/watts-bar-intruder-shooting-under-federal/  
The cooling tower of the single operating reactor at the Watts Bar Nuclear Plant belches steam in Spring City, Tenn. (Photo by Contributed Photo /Chattanooga Times Free Press)

The FBI has joined the TVA and the Nuclear Regulatory Commission investigating a trespasser who exchanged gunfire with a security officer on the property of the Watts Bar Nuclear Plant early Sunday morning.

It is unclear why the intruder -- who escaped -- was there, and investigators are saying little.

But the nuclear plant, like all federal facilities, remains under high security alert in the aftermath of the Boston bombings last week, and investigators combed the area -- even with helicopters and surveillance aircraft -- for well over 12 hours Sunday.

"It's been a long day," FBI Special Agent Ed Galloway said Sunday evening. "All I can say is that we are devoting our resources and we are committed to resolving any issues here."

TVA officials said there was no threat to public safety or the security of the plant as the shots were fired well away from the plant's "protected area."

Jim Hopson, a TVA spokesman stationed at Watts Bar, said the incident occurred about 2 a.m. when a TVA security officer patrolling the plant's perimeter encountered the intruder near the river, about 200 yards away from the cooling towers in territory clearly marked as a restricted area.

"The officer challenged that individual, and the individual fired at the officer," Hopson said. "The officer returned the fire, and as the officer was calling for backup as well as switching to a higher-powered weapon [he] had in the vehicle, the individual fled the site."

The officer was not injured, though his truck was struck, he said, and both the intruder and the officer fired multiple shots.

Hopson said he did not know how the person escaped -- by river or land. There was no indication that the intruder was injured.

He said investigators -- along with Rhea and Meigs County officials -- spent hours combing the riverbanks around the plant and across the reservoir on the Meigs County side.

"A very detailed search of the site [including the plant's protected area] ... did not turn up any threats, which was why we exited out of the 'unusual event' notification," Hopson said.

The incident occurred about two football fields away from what TVA refers to as the plant's "protected area" where the reactors and power production equipment sits. But the river side is where water intakes are located that carry cooling water into the plant. The water that has circulated in enclosed pipes around the plant and through cooling towers is returned to the river.

NRC spokesman Roger Hannah said inspections of the protected area, the river area and that intake pumping station were made before the unusual event alert was ended.

"The plant staff has notified the NRC that it will continue to maintain security at higher than normal levels," Hannah said, adding that two security inspectors from NRC's Atlanta office will review the incident and TVA's response.

The Watts Bar plant is near Spring City and about 48 miles northeast of Chattanooga. One reactor there is at 100 percent power, and a second reactor is under construction.

TVA has had security problems at Watts Bar before, and two contractors have been convicted of falsifying records about inspections of nonexistent electrical cable that would have served the newest reactor's cooling system.

The NRC in 2011 placed Watts Bar under a security safety flag for several months, but neither TVA nor NRC would discuss why.

U.S. District Attorney William "Bill" Killian said he could not comment Sunday about this newest security investigation.

***Pam Sohn*** *has been reporting or editing Chattanooga news for 25 years. A Walden’s Ridge native, she began her journalism career with a 10-year stint at the Anniston (Ala.) Star. She came to the Chattanooga Times Free Press in 1999 after working at the Chattanooga Times for 14 years. She has been a city editor, Sunday editor, wire editor, projects team leader and assistant lifestyle editor. As a reporter, she also has covered the police, courts, health, education and environment beats. She specializes in investigative and project stories, and currently is a general assignment reporter. She has won dozens of writing and editing awards in both Alabama and Tennessee, including first-place honors for breaking news, investigative news, public service, features and reporting without a deadline. During her tenure as Sunday editor at the Chattanooga Times Free Press, the paper received the 2002 first-place honors for Best Sunday editions and Sweepstakes Award — best paper in the state.*

# Better Understanding North Korea: Q&A with Seven East Asian Experts, Part 1

Source: http://blogs.fas.org/security/2013/04/better-understanding-north-korea-part-1/

***Editor’s Note:*** This is the first of two postings of a Q&A conducted by the Federation of American Scientists regarding the current situation on the Korean Peninsula.  Author responses have not been edited; all views expressed are their own. Please note that additional terms are used to refer to North Korea and South Korea, i.e., the DPRK and ROK respectively.

Researchers from the Federation of American Scientists (FAS) asked seven individuals who are experts in East Asia about the the recent escalation in tensions on the Korean Peninsula. Is North Korea serious about their threats and are we on the brink of war? What influence does China exert over DPRK, and what influence is China wiling to exert over the DPRK? How does the increase in tension affect South Korean President Park Guen-he’s political agenda?

This is the first part of the Q&A featuring **Dr. Ted Galen Carpenter**, **Dr. Balbina Hwang**, **Ms. Duyeon Kim** and **Dr. Leon Sigal**.

## Dr. Ted Galen Carpenter

***Senior Fellow for Defense and Foreign Policy Studies at the Cato Institute***

Q: *Previously you have made the case for the United States to withdraw troops from South Korea and let it handle its own security. However, the joint exercises and formulation of the “Extended Deterrence Policy Committee”* *suggests that the United States and South Korea likely are moving in the opposite direction. Can you explain to our readers why less, not more, U.S. involvement in South Korea would improve the security situation on the Korean Peninsula?*

A: The primary issue is not whether reducing U.S. involvement would improve the overall security situation on the Korean Peninsula, but whether it would reduce the risk of the United States becoming involved in a nasty war that has only peripheral relevance to America’s own security and other vital interests. As it so happens, though, withdrawing U.S. troops and bases probably would improve the security environment on the Peninsula. Ending the U.S. security commitment to South Korea would create a powerful incentive for Seoul to devote far more effort than it does currently to strengthen its own defense. As matters now stand, it is much too convenient for South Korea to rely on Washington’s defense guarantee and be a free rider on American taxpayers. Given North Korea’s bellicose, unpredictable nature, it is irresponsible for Seoul to be spending only 2.6 percent of the country’s gross domestic product on defense, yet it continues to do so. That may please South Korean taxpayers who enjoy the U.S-provided subsidy, but it means that the ROK’s deterrence and war-fighting capabilities are not sufficient for the current security environment. Given the ROK’s heavy reliance on the U.S. for defense, North Korea might be tempted at some point to see if America’s willingness to go to war to protect South Korea is real or a bluff. It is almost certainly real, but if Pyongyang believed otherwise, a tragedy would ensue. Conversely, no North Korean leader would ever assume that a well-armed South Korea would not fight to preserve its independence. Since South Korea’s population is twice that of North Korea’s and the economy is about 40 times as large, there is no reason for America to incur needless risks to defend another country that should be perfectly capable of defending itself.

Q: The United States’ security policy towards the ROK is still framed as a matter of “extending deterrence” as it was during the Cold War. To that end, the two countries recently established aforementioned “Extended Deterrence Policy Committee,” a development that effectively institutionalizes this mode of joint defense planning. This, in turn, has precipitated a “Counter Provocation Plan” to prevent acts of aggression by the DPRK. Do you think that “extended deterrence” is still an efficacious approach to improving the ROK’s security? More specifically, how can the success of the “Counter Provocation Plan” be critically assessed when evidence of its failure (for example, acts of aggression by the DPRK) are typically construed as a basis to do more of the same?

A: Extended deterrence is inherently less credible than primary deterrence—deterring an attack on one’s own country. An adversary always has reason to wonder whether a guarantor power would really risk the destruction and casualties of war merely to protect an ally or security client. That credibility is especially uncertain when an adversary has the capability to attack the homeland of the guarantor power, but it is in doubt even with respect to a country like North Korea that does not have that ability. The North Korean leadership might delude itself into thinking that the U.S. would not fight a costly, bloody war just to save South Korea.

The “counter-provocation plan” is unwise on two levels. If the U.S. is committed to deterring a second Korean War, it should make it clear to Pyongyang that any North Korean military offensive would be met with a devastating retaliation with the goal of extinguishing the trouble-making North Korean state. The prospect of a limited, “tit-for-tat” response could actually encourage the DPRK to test whether the U.S. extended deterrence policy regarding South Korea is real. At the same time, the tit-for-tat approach to an incident always entails the risk of unintended escalation that spirals out of control, producing the larger war that it’s supposedly designed to prevent.  It is a strategy that has major drawbacks and almost no benefits.

Q: You have argued (and here I paraphrase) that there is a reflexive tendency in the United States to apportion much of the blame for North Korea’s negatively viewed actions on China for failing to constrain its “ally.” Others may argue that the pressure has been successful in getting China to be more assertive with sanctions and taking other measures – such as cutting off the sale of crude oil, tightening inspections of cargo shipments destined for North Korea, etc. – to punish or pressure the North Koreans. Is the narrative that China has the ability to constrain North Korea a useful one, even if overstated?

A: China does have some ability to constrain the DPRK, but there is a tendency among U.S. pundits and policy experts to exaggerate that ability. Granted, China is one of North Korea’s few allies, and is by far its most important ally, providing that dysfunctional country with most of the food and energy supplies it requires. But that does not translate into being able to treat North Korea as a puppet. The relationship is not akin to the Soviet Union’s total domination of satellites such as East Germany during the Cold War.  Kim Jong-Un’s regime has its own interests, policies, and priorities, and an especially high priority is developing the country’s nuclear and ballistic missile capabilities.

Beijing has compelling reasons for not wanting to put massive pressure on Pyongyang, even in response to Pyongyang’s repeated defiance of China’s wishes. Applying that kind of pressure would risk having the North Korean regime implode, and Beijing is understandably reluctant to risk chaos on its border. Moreover, the U.S. has offered Beijing no incentive to gamble and accept the possibility of such an unpalatable outcome. In addition to the refugee crisis that might ensue, the likely long-term result would be the reunification of Korea under a pro-U.S. government. Even worse from China’s standpoint, a united Korea would inherit South Korea’s mutual security alliance with the United States. North Korea has served as a buffer between the Chinese homeland and the rest of East Asia dominated by Washington and its allies. That buffer would now be gone, and Beijing would face the prospect of U.S. military bases in what had been North Korea. No Chinese leader would tamely accept such a shift in the regional strategic balance.

If Washington wants Beijing to put more extensive pressure on Pyongyang to end its missile and nuclear programs and stop its warlike rhetoric (at the risk that the North Korean state might collapse), it must offer China some meaningful incentives. The most significant incentive would be to agree to withdraw all U.S. troops from the Korean Peninsula and terminate the alliance with Seoul upon Korean reunification. That step would eliminate Beijing’s worries that by coercing North Korea, it would risk having a U.S. military client—and U.S. bases—perched on China’s border. Unfortunately, there is no sign that U.S. leaders are willing to take the long-overdue step of ending its alliance with South Korea.

Q: What do the ongoing standoffs with North Korea and Iran say to you about the power and effectiveness of U.S. diplomacy vis-à-vis nuclear-related issues of great concern? The United States has been engaging these countries in one way or another (sometimes by ignoring them, sometimes by negotiating with them) for over a decade and yet few salient issues are ever solved. Certainly there is plenty of blame to be shared, but is there anything that the United States can do to be more effective when negotiating with its adversaries? If so, why aren’t such tactics in use?

A: To be effective, diplomacy must be based on realistic demands and a willingness to offer meaningful benefits to the opposing party in return for improved behavior. Washington’s policy toward Iran and North Korea fails on both levels. The demands are utterly unrealistic. In Iran’s case, Washington insists not only that the government refrain from developing nuclear weapons, but that it even give up the ability to enrich uranium and control the nuclear fuel cycle. In North Korea’s case, the U.S. demands that Pyongyang abandon a nuclear program that it has invested more than two decades of effort and billions of dollars, and which has already produced at least a few nuclear devices. Those goals are simply not realistic. Both Iran and North Korea have significant incentives for wanting to build at least small nuclear deterrents. Not only do they face major regional rivals, but they take note of how the United States has pursued forcible regime change against countries that did not have such deterrents.

The fate of Saddam Hussein’s Iraq and Muammar Kaddafi’s Libya have not gone unnoticed.

Expecting Iran and North Korea to accept Washington’s good intentions as the principal guarantee of their security is a bit much, given that track record. For those countries even to consider taking such a risk, there would have to be extremely appealing benefits offered in exchange for abandoning their nuclear aspirations. But the U.S. has offered meager incentives—nothing more than the *partial*lifting of sanctions. The bottom line is that no country would cave-in to Washington’s demands in exchange for such paltry concessions—unless that country had no alternative. But neither Iran nor North Korea is in a position akin to Germany or Japan during the final days of World War II. Therefore, they are not likely to accept the diplomatic equivalent of unconditional surrender. Unless Washington drastically changes its negotiating strategy, the stalemates with Tehran and Pyongyang will continue—or degenerate into outright war.

## Dr. Balbina Y. Hwang

**Research Fellow at the Institute for National Security Strategy (Korea)**

Q: The past few months have brought new leaders to not just North Korea, but also South Korea and China. How does the increase in tension affect South Korean President Park Guen-he’s political agenda, e.g. is it a distraction from other priorities or forcing foreign policy changes?

A: The North Korean threat is an existential reality for South Korea, and has been so from its inception as the Republic of Korea in 1948; indeed, the ROK’s very existence was directly in opposition to the establishment of the Democratic People’s Republic of Korea in the North. As such, the possibility of tensions with North Korea has always been the foremost priority for every leader of South Korea. Additionally, the specter of the North’s nuclear threat has existed for the last five presidents (since Kim Young Sam). Given this reality, North Korea was not the central issue in the last several presidential elections in South Korea, and the South Korean electorate clearly prioritized the resolution of domestic issues, such as improvement of the economy and social welfare, in the last election. In this regard, the current media focus on the threats emanating from North Korea are a temporary distraction, but will not diminish domestic pressure on President Park to accomplish her pledges to transform the economy and society. Ironically, increased North Korean bellicosity may have reduced any dilemmas President Park may have faced about re-engaging North Korea. It will be difficult, if not impossible, for her to pursue any engagement in the short-term, and her responses to any real attacks from the North will likely be firmer and more pro-active than she may have liked or wanted.

Q: How are attitudes about the North Korea changing among South Korea’s public – in general and during the current situation? Additionally, what do the latter think of the response so far by South Korean President Park and the United States?

A: The tendency of most analysts is to make sweeping conclusions about South Koreans’ changing attitudes towards the North: five years ago, it was common to conclude that South Koreans no longer viewed its northern brethren as a threat; after the two incidents in 2010 (North Korean attacks on the Cheonan and Yeongpyong Island), it was assumed that suddenly South Korean attitudes towards the North had dramatically changed. Attitudes towards the North cannot be generalized into generational differences – it is often mistakenly assumed that the older generation who lived through the Korean War considers the North a threat while the younger generations do not. Such conclusions are not only inaccurate, they are not particularly useful. The reality is that South Korean society is far more diverse and pluralistic than outsiders assume, and sentiments towards the North are highly complex. Any particular South Korean (regardless of age or gender) may simultaneously express both heightened anxiety over North Korean threats while also dismissing the possibility of a military attack against the South as improbable if not impossible. Or many citizens may express skepticism and cynicism about using engagement to persuade North Korea to change its behavior and ambitions – for example towards denuclearization – but the same citizens also support engaging the North and using inducements instead of force to achieve change. While such views may seem contradictory and even illogical to many outsiders, they represent a default psychology for the 20 million citizens who live within an immediate 100 kilometer target zone of a North Korean artillery threat.

What has fundamentally changed in the last two decades is a dramatic shift in South Korean perceptions about the nature and sources of the North Korean threat: prior to the North Korean famine in 1994, it was the *strength* of the regime along the lines of the traditional cold war view, but evidence of a decaying and starving country changed South Korean perceptions of the threat as emanating from the Pyongyang regime’s fundamental *weakness*. The specter of having to absorb a collapsed North seemed a far greater threat to the South Korean way of life than an invasion by a relatively weakened North. In this context, the Sunshine Policy seemed a logical policy to address the source of the imminent North Korean threat. Today, however, in the aftermath of little progress in confrontation with the North despite billions spent on engaging Pyongyang, three nuclear tests, and numerous missile launches, South Koreans understandably have far more complex perceptions of the threat posed by the North. The danger from the North today is paradoxical, emanating *both* from the regime’s growing military strength and its structural weakness, resulting in complex and thus seemingly incoherent views about the North.

Q: *How do you think the recent escalation in tensions could affect the ROK’s public perception of the United States — in particular, its military presence on the Korean peninsula?*

A: Due to complex South Korean perceptions about the North Korean threat (as discussed above) and North Korea’s increasing belligerence, the majority in the South have come to appreciate the crucial roles the U.S. military presence on the Peninsula and the U.S. commitment through its alliance contributes to deterring a major attack by the North. This does not mean, however, that traditional South Korean issues with the United States, such as resentment among some about seemingly disproportionate U.S. influence in Korean affairs, and the panoply of problems arising from an American military footprint have disappeared, or even been resolved. Such issues will continue to be politicized and remain irritants in the bilateral relationship, but the alliance is currently receiving greater popular support and acceptance, at least in the short term.

## Ms. Duyeon Kim

***Senior Non-Proliferation and East Asia Fellow at the Center for Arms Control and Non-Proliferation***

Q: North Korea is continuing with acts of aggression and officials say it is preparing another missile launch. Is this another sign of Pyongyang preparing for war and are we on the brink of war?

A: Mistakes, miscalculations, or misunderstandings of intentions on either side of the 38th parallel could unintentionally trigger military conflict. The West Sea has always been a theater for inter-Korean skirmishes and a possible target for a North Korean attack on South Korean islands.

It was believed during the Kim Jong-il era that North Korea was not suicidal enough to start a war because the regime knew that the United States and South Korean militaries could instantly destroy it. Pyongyang’s objective is regime survival. Still, as witnessed in the North’s shelling of South Korea’s Yeonpyeong Island in 2010, Pyongyang can provoke enough just short of war believing that the United States would not strike back.

This belief generally seems to hold true today during the Kim Jong-un era but with many variables and question marks. It is said that the military – that has had no contact with the outside world unlike the Worker’s Party – essentially holds power, which could potentially drive the regime to its own destruction if military leaders decide to “go all the way” and initiate a war. Since Kim Jong-un has rallied his people in preparation for war, it is also unclear whether he would feel pressured to follow through with a display of force.

The recent enhancement of Washington’s hardware in the region could be interpreted as having multiple audiences and messages. It tells both North and South Korea that the United States is committed to defending South Korea and to its extended deterrence. It perhaps even helps prevent Seoul from “going too far” in the wake of having received a major blow in 2010 and being determined to retaliate with force the next time it is attacked. Finally, it tells China to be prepared for possible consequences should the North provoke.

The challenge is to what extent the United States should show its capability so as not to send North Korea the wrong message that it is preparing to attack the regime – so again, the element of Pyongyang mistakenly misinterpreting U.S. intentions. The North has always claimed that its nuclear and missile developments are to deter a “hostile U.S. policy” and attack against it.

The Pentagon’s publically announced decision to delay an intercontinental ballistic Minuteman 3 missile test should have been the loudest cue for Kim Jong-un to dial back his military posturing and save face before his hardline military leaders. It was a free propaganda tip and chance for the young Kim to spin Washington’s move as a gesture of defeat, claiming victory for Pyongyang. However, the new round of war rhetoric may indicate that Kim Jong-un missed the opportunity or has other objectives.

It is not surprising that Pyongyang would be preparing for another missile launch. Continued North Korean missile and nuclear tests can be expected for two general reasons. Technologically, the regime would need more tests to perfect both capabilities. Politically, continued testing could prove North Korea’s “might” to both its domestic and international audiences, as it strives to be recognized as a nuclear weapons state and achieve its goal of becoming a “strong and prosperous nation.” The key question is whether the upcoming launch – believed to be of a Musudan missile – is merely a test or has a target. The answer would determine the U.S., ROK, and Japanese response. It is important to narrow the room for any misunderstandings and misinterpretation of each side’s intentions.

April 15th, the birthday of North Korea’s founder and Kim Jong-un’s grandfather Kim Il-sung, may be the turning point; so we will need to see what signals come out of Pyongyang and whether it decides to opt for dialogue or continued tensions. The events post-April 15th could also be a prelude to the fate of ROK President Park Geun-hye’s “trust process.”

Q: *Why is North Korea beating such a loud drum and are they serious about their threats?*

A: North Korea is predictable because it generally follows through with its threats in some form, depending on time and circumstance. History has shown that the regime tends to announce its plans before acting upon them. The unpredictable element has generally been timing. The key variable now is Kim Jong-un’s calculus and decision-making style, as we seem to be witnessing a young leader who acts quicker and may lack the kind of depth in calculations seen in his predecessors. It is unclear whether Kim Jong-un has calculated in an exit strategy. North Korea’s decades-old sound-bite has been that “Washington wants to attack us.” This is the starting point in understanding its behavior.

Kim Jong-un’s constant stream of provocations and threats seem to have combined domestic and international objectives but may be fueled largely by domestic drivers. Kim Jong-un needs to consolidate his power base, prove his power to his constituents (particularly the military), fulfill his late father’s legacy while establishing his own, and strive to be recognized by the international community as a nuclear weapons state. Kim Jong-un also needs to fulfill Kim Jong-il’s orders to become a “strong and prosperous nation,” an endeavor that began in 2012. In addition, the latest threats appear to be a reaction to U.S. and UN sanctions against its latest nuclear and missile/rocket tests. But Pyongyang’s end goal seems to be negotiating a peace treaty with the United States.

By creating a volatile, war-like situation on the Korean Peninsula, it helps justify Pyongyang’s demand to negotiate a peace treaty with Washington to replace the armistice agreement that ended the 1950-1953 Korean War and to ultimately rid U.S. troops from the peninsula. The U.S.’ long-standing position has been denuclearization before talks of a peace treaty, as reflected in the September 2005 agreement struck under the Six Party Talks. Kim Jong-un may also be trying to justify the regime’s decades-old propaganda to its people that the United States wants to attack North Korea.

Q: *The past few months have brought new leaders to not just North Korea, but also the South Korea and China. How does the increase in tension affect South Korean President Park Geun-hye’s political agenda, e.g. is it a distraction from other priorities or forcing foreign policy changes? How are attitudes about North Korea changing among the South Korean public and what is their view of the South Korean and the United States’ response?*

A: South Korea’s top national security concern is the North Korean problem, so the latest tensions do not change Seoul’s foreign policy priorities. Pyongyang’s third nuclear test, however, immediately tested and placed limitations on implementing President Park Geun-hye’s North Korea policy, which is rooted in what she calls “trust process.”

It is difficult to generalize about the ROK public’s attitudes toward the United States, ROK government, and North Korea, as it is divided like all democracies – you will always have the doves and hawks. At the same time, however, opinion polls have showed that the public generally supported a more hardline South Korean stance when Yeonpyeong Island was shelled. Another military provocation might narrow the political divide in the ROK, rather than splitting it as Pyongyang has typically desired.

Q: *Due to such a volatile situation on the peninsula, shouldn’t dialogue be pursued to reduce tensions and what can South Korea do?*

A: While dialogue should always be a part of the policy toolkit and serves, at a minimum, as a useful tool for intelligence gathering purposes into such a reclusive country, the main question is: What can be discussed at the table after decades of negotiations and no sustainable breakthrough? North Korea has made it clear through official commentaries that it will not abandon its nuclear weapons and missiles, and that it is only interested in peace treaty negotiation and not Six Party Talks-like discussions. In other words, Pyongyang is saying it wants to keep its nuclear weapons while negotiating a peace treaty, which would be unacceptable for Washington.

In the aftermath of another nuclear and rocket/missile test and more war threats, it is politically difficult, if not impossible, for Washington to initiate dialogue with Pyongyang. The dust and noise would need to settle and this has typically taken around six months to a year before we see diplomatic movement. China is the only country that could reach out to North Korea, but the question is whether Pyongyang would be interested in such talks, as there is said to be deep-seeded anti-Chinese sentiment in North Korea. Seoul is also constrained under the current circumstance, but while President Park Geun-hye maintains a tough stance toward Pyongyang’s belligerence, she has also recently signaled the door remains open for dialogue and is willing to provide humanitarian assistance if Pyongyang chooses “the right path,” thus activating her “Korean Peninsula trust process.” Last week, Pyongyang rejected President Park’s offer of dialogue, calling it a “cunning ploy” and an “empty shell.”

An exit strategy needs to be devised that saves face for Pyongyang, reduces tensions on the Peninsula, and ultimately paves the way to eventually resolve the North Korean dilemma.

## Dr. Leon Sigal

***Director of the Northeast Asia Cooperative Security Project at the Social Science Research Council in New York***

Q: What influence, if any, could China exert over the Democratic People’s Republic of Korea (DPRK) in this situation? Given that, what degree of influence, if any, is China willing to exert over the DPRK in this environment?

A: In practice, much of the trade and investment is conducted by private Chinese firms and trading companies, heavily concentrated in predominantly Korean provinces of China along the border with North. These provinces, which are less prosperous than other parts of China, would plunge into recession in the event of a that China cut off trade and investment with these firms and companies. In practice, too, no one knows how North Korea would respond to a cutoff and what would happen to its nuclear assets in the event of instability. Above all, the steps taken to reassure U.S. allies also antagonize China—joint exercises that include flights of B-52 and B-2 bombers or the dispatch of aircraft carriers to Korea, expanding missile defenses, and helping South Korea to develop longer-range ballistic missiles (to add to the long-range cruise missiles it recently deployed). It is utterly unrealistic to expect China to abandon North Korea as the United States moves to shore up its alliances by military rebalancing.

Q: Major joint military exercises between the United States and the Republic of Korea (ROK) (such as the annual Key Resolve/Foal Eagle) have consistently been a flashpoint which Pyongyang uses to justify threats and escalatory behavior including nuclear threats. Is the situation today within the normal parameters for such a reaction or are there novel or unexpected aspects to the DPRK’s behavior? Likewise, has there been anything novel or unexpected in the United States’ counter-response?

A: The circumstances have made this year’s reaction more extreme than those in the past. First, after China cooperated with the United States to draft a U.N. Security Council resolution tightening sanctions, the North did what it always does whenever Washington and Beijing work in concert—raise tensions to provoke discord between them. China’s efforts to calm Pyongyang down instead of bringing it to its knees lead many in Washington to accuse Beijing of coddling its neighbor. Second, U.S.-South Korea annual joint exercises kicked off last month. Unlike the recent past, they included practice bombing runs by B-52 and B-2 bombers in South Korea and the dispatch of F-22 stealth fighter plans and an attack submarine to the peninsula. Third, more speculatively, Kim Jong-un seems to be adopting his own version of the Eisenhower administration’s “bigger bang for a buck,” building up its nuclear capability in order to reallocate some resources from military to civilian production. Whether that is his aim remains to be seen.

Q: *How accurate do you think non-Asian media outlets have been in their representation of the DPRK’s intents and actions.*

A: News media accounts have amplified Pyongyang’s rhetorical threats — often without noting that they came in response to military moves by Washington and Seoul. The threats all seem intended to underscore North Korea’s own posture of deterrence—and are explicitly predicated on prior action by the United States or South Korea. Paradoxically, the emphasis on Pyongyang’s verbal bombast tends to drown out the real threat Pyongyang poses: its unbounded nuclear and missile potential. Its February 12 nuclear test showed it is well on the way to perfecting a compact weapons design capable of being mounted on a missile. It now says it will restart its nuclear reactor at Yongbyon to generate plutonium and will enrich uranium for weapons. And it may be moving to test-launch a new missile capable of reaching Japan or possibly Guam.

Q: What policy should the United Stated be adopting, what are the key dynamics that policy formulation should recognize and address?”

A: First, that the very steps that each side in Korea takes to bolster deterrence increase the risk of deadly clashes, as demonstrated by incidents such as the sinking of the South’s ROKS Cheonan in March 2010 in retaliation for the November 2009 shooting up of a North Korean navy vessel and a November 2010 artillery exchange in the contested waters off Korea’s west coast. Deterrence alone will not assure calm on the peninsula. The way to reduce the risk of further clashes is a peace process in Korea in parallel with renewed negotiations to rein in the North’s nuclear and missile programs. Pyongyang has long said it wants a peace treaty ending the Korean War. Probing whether it means what it says is in South Korean and U.S. security interests, especially now that North Korea is nuclear-armed.

Second, picking a fight with China will not get North Korea to behave. No chorus of disclaimers from Washington will persuade Beijing that the U.S. military rebalancing to Asia is not aimed at containing it. Washington needs to accompany military rebalancing with a political and diplomatic rebalancing toward China, and encourage its allies to do the same. Cooperation has to be a two-way street.

## Expert Biographies

***Ted Galen Carpenter*** *is senior fellow for defense and foreign policy studies at the Cato Institute. Dr. Carpenter served as Cato’s director of foreign policy studies from 1986 to 1995 and as vice president for defense and foreign policy studies from 1995 to 2011. He is the author of nine and the editor of 10 books on international affairs, including The Fire Next Door: Mexico’s Drug Violence and the Danger to America, Smart Power: Toward a Prudent Foreign Policy for America, America’s Coming War with China : A Collision Course over Taiwan, The Korean Conundrum: America’s Troubled Relations with North and South Korea, Bad Neighbor Policy: Washington’s Futile War on Drugs in Latin America, The Captive Press: Foreign Policy Crises and the First Amendment, Beyond NATO: Staying Out of Europe’s Wars, and A Search for Enemies: America’s Alliances after the Cold War. Carpenter is contributing editor to the National Interest and serves on the editorial boards of Mediterranean Quarterly and the Journal of Strategic Studies, and is the author of more than 500 articles and policy studies. His articles have appeared in the New York Times, the Washington Post, the Wall Street Journal, the Los Angeles Times, the Financial Times, Foreign Affairs, Foreign Policy, the National Interest, World Policy Journal, and many other publications. He is a frequent guest on radio and television programs in the United States, Latin America, Europe, East Asia, and other regions. Carpenter received his Ph.D. in U.S. diplomatic history from the University of Texas.*

***Balbina Y. Hwang*** *is currently an Adjunct Research Fellow at INSS (Institute for National Security Strategy), Seoul, Korea. She is also a visiting Professor at Georgetown University, where she teaches courses on East Asian political economy. From 2007 to 2009, she served as Senior Special Advisor to Ambassador Christopher Hill, Assistant Secretary for East Asian and Pacific Affairs, at the U.S. State Department. From 2009 to 2010, she taught Northeast Asian Security at National Defense University. Prior to joining the State Department, she was Senior Policy Analyst for Northeast Asia in the Asian Studies Center of The Heritage Foundation, a think tank. Dr. Hwang is the author of numerous articles and book chapters, and has received several writing awards. She has provided expert testimony before Congressional hearings, and is a frequent commentator for major international media outlets. A native of Korea, Dr. Hwang was a Fulbright Scholar to South Korea (1998-99) where she conducted doctoral dissertation field research. Dr. Hwang earned degrees from: Georgetown University (PhD); Columbia University (MIA); Darden – University of Virginia (MBA); and Smith College (BA).*

***Duyeon Kim*** *is the Senior Non-Proliferation and East Asia Fellow at the Center for Arms Control and Non-Proliferation where her policy work focuses on nuclear non-proliferation, North Korea and nuclear security. Prior to joining the Center, Kim was a career Diplomatic and Security journalist having served as the Foreign Ministry Correspondent and Unification Ministry Correspondent for South Korea’s Arirang TV based in Seoul. Her stories mainly covered North Korea’s nuclear programs, the Six Party Talks, inter-Korean relations, the Korea-US alliance, South Korean diplomacy, U.S. foreign policy and the United Nations. Kim has sat down with world leaders on countless occasions interviewing dignitaries including UN Secretary-General Ban Ki-moon and UN agency chiefs, former Indonesian President Megawati Soekarnoputri and senior officials across the world. While working towards her master’s degree, Kim continued to file reports for Arirang TV from Washington, DC while freelancing for South Korea’s JoongAng SUNDAY and KBS’ 50-minute TV news special “Ssam” covering U.S. reaction to North Korean provocations. Kim has written for major publications including the Bulletin of the Atomic Scientists, World Politics Review and The New York Times. Kim was also interviewed on TV including CBS, BBC, AFP TV, South Korea’s KBS, South Korea’s Arirang TV and China’s Xinhua News Agency while quoted in The Washington Post, AFP, Korea Herald, Nature, Korea Times, JoongAng Ilbo, Seoul Shinmun, and Asia Times. Kim holds an M.S. in Foreign Service concentrating in International Relations and Security from the Georgetown University School of Foreign Service and a B.A. in English literature from Syracuse University.*

***Leon V. Sigal*** *is director of the Northeast Asia Cooperative Security Project at the Social Science Research Council in New York. His book, Disarming Strangers: Nuclear Diplomacy with North Korea, published by Princeton University Press, was one of five nominees for the Lionel Gelber Prize as the most outstanding book in international relations for 1997-98 and was named the 1998 book of distinction by the American Academy of Diplomacy. His most recent book, Negotiating Minefields: The Landmines Ban in American Politics, was published by Routledge in 2006. Sigal was a member of the editorial board of The New York Times from 1989 to 1995. He served in the Bureau of Politico-Military Affairs at the U.S. Department of State, in 1979 as International Affairs Fellow and in 1980 as Special Assistant to the Director. He was a Rockefeller Younger Scholar in Foreign Policy Studies at the Brookings Institution in 1972-1974 and a guest scholar there in 1981-1984. From 1974 to 1989 he was a professor of government at Wesleyan University. He was an adjunct professor at Columbia University’s School of International and Public Affairs from 1985 to 1989 and from 1996 to 2000 and a visiting lecturer at Princeton University’s Woodrow Wilson School in 1988 and 2000. Sigal is also the author of Reporters and Officials: The Organization and Politics of Newsmaking, Alliance Security: NATO and the No-First-Use Question (with John Steinbruner), Nuclear Forces in Europe: Enduring Dilemmas, Present Prospects, Fighting to a Finish: The Politics of War Termination in the United States and Japan, 1945, and Hang Separately: Cooperative Security Between the United States and Russia, 1985-1994, as well as numerous articles in Foreign Affairs, Foreign Policy, The Atlantic Monthly, and Bulletin of the Atomic Scientists, among others. He edited The Changing Dynamics of U.S. Defense Spending.*

# Part 2

## Dr. Yousaf Butt

***Research Professor and Scientist-in-Residence at the James Martin Center for Nonproliferation Studies at the Monterey Institute for International Studies***

Q: *Does North Korea have the capability to use its missiles to strike the* United States with nuclear weapons? How serious is that threat?

A: There are three main technical hurdles for North Korea in this respect: one is making and testing powerful enough — and sufficiently reliable — long range rockets to be able to send a heavy (~1000 kg) payload to the U.S. mainland. North Korea has not embarked on such a testing program yet. Another is miniaturizing their nuclear devices to be able to mount them on missiles and making the warheads robust enough to withstand the stresses of rocket flight. An ICBM nuclear delivery system also requires a re-entry vehicle (RV) to protect the nuclear device as it re-enters the atmosphere close to its target: during re-entry the RV will heat up tremendously due to the high speed. It is unlikely North Korea has mastered this technology yet.

These are very challenging problems and, in my view, North Korea is many years from being able to hurl a nuclear device to the U.S. mainland.

To be perfectly clear: my point isn’t that we don’t need to worry about North Korean nuclear devices for some years, but – to the contrary —  that we ought to be concerned *already*. If the North Koreans wanted to carry out a nuclear first strike they could already do so using small boats containing clunky (un-miniaturized) devices. This delivery method has the benefit – from the North Korean perspective – of being far less attributable, and substantially reduces the chances of an immediate devastating retaliatory strike on their nation.

Returning to the issue of the missiles: miniaturizing a nuclear device implies both volume and mass constraints: the nuclear device must be both light enough and small enough to fit on a missile.  It also needs to withstand the rigors (high g-forces, vibration, temperature excursions, vacuum etc.) of missile flight. Reports from last week indicate that the Defense Intelligence Agency (DIA) has “moderate confidence” that North Korea could perhaps miniaturize nuclear warheads sufficiently to mount them on some missiles –  but that, even so, in their judgment any such delivery system would have “low reliability”. It should also be noted that the director of national intelligence, James Clapper Jr., released a statement saying that the DIA assessment did not represent a consensus of the nation’s intelligence community and that “North Korea has not yet demonstrated the full range of capabilities necessary for a nuclear armed missile.” The State Dept also contested the DIA’s “moderate confidence” finding, with Secretary of State Kerry saying that Pyongyang still hadn’t developed or fully tested the nuclear capacities needed for such a step.

In any case, those are just some of the technical aspects of the problem, but one must also ask if the North Koreans would be foolish enough to launch a nuclear tipped missile at the United States given the fact that the U.S. can trace the origin of long-range missiles using infra-red sensors on our surveillance satellites. Any such attack would invite massive retaliation, and would likely mean the end of the regime.  Reuters reported that Kim Jong Un recently stated that North Korean nuclear devices are for deterring war.

Right now, I worry more about the already existing and less attributable delivery methods such as boats rather than the missiles.

Q: *But the Daily Beast broke a story on Monday [April 15] saying that the United States recovered the wreckage of the nosecone of the North Korean satellite launch rocket from December and that it indicated that the North Koreans “had figured out the warhead piece.” Do you have any insight into how credible or important this development is? Has North Korea really mastered re-entry vehicle (RV) technology?*

A: Unfortunately, the *Daily Beast* story does not have any meaningful technical details so it is hard to assess how important a development it is – it would be very useful if the government analysts would release some further information. The article states that the “front of the satellite rocket, according to three U.S. officials who work closely on North Korean proliferation, gave tangible proof that North Korea was building the missile’s cone at dimensions for a nuclear warhead, durable enough to be placed on a long-range missile that could reenter the earth’s atmosphere from space.” This seems to be merely a consistency argument based on spatial dimensions and definitely does not mean North Korea has mastered RV technology. In fact, the Unha rocket’s upper-stage, to which the North Korean satellite was attached, is still in orbit cataloged as NORAD-39027.

What seems to have been recovered is the upper-stage nosecone fairing;  its size seems to be consistent with that needed for a nuclear device. But it may also be consistent with the satellite it contained. The fairing may also have been designed prior to the satellite and may have been bigger than it needed to be, but this does not imply the satellite launch was really a weapons test. In fact, Markus Schiller has convincingly argued why the launcher seemed more consistent with a space launch vehicle rather than an ICBM.

Michael Elleman also has an excellent technical and historical brief on the North Korean rocket which is worth reading in its entirety and argues that although such launches may be troubling they are no “substitute for ballistic missile testing”. So while developing and testing the rocket certainly gives North Korea experience with technology that can be used for a ballistic missiles, it appears that the launch wasn’t really a ballistic missile test masquerading as a satellite launch.

Besides the spatial dimensions of the upper-stage fairing which prove little in themselves, there is the mention of “durable” in the *Daily Beast* piece.  This could refer to simply over-engineering the nose fairing – something a fledgling space launch state would be apt to do, just to be on the safe side. A nosecone fairing would also not be very useful as an RV test during the fairing’s re-entry because it does not have the right ballistic coefficient (ratio of an object’s mass relative to its cross-sectional area). Also, it does not appear that North Korea even attempted to recover the fairing to check on any such test.

With the information that has been released so far, I do not see any clear connection to RV testing, and no indication that North Korea has mastered RV technology. For that, they would need to conduct real RV tests of objects with the correct ballistic coefficients and materials. Until the North Koreans have mastered RV technology and made miniaturized nuclear weapons that are resistant to high-g’s and vibration etc., and tested the ICBMs’ precision targeting they cannot reliably hurl a functioning nuclear weapon to a given target on the U.S. mainland.

On the other hand, if a sneaky first strike is what they wanted to do all along, a large clunky boat-borne nuclear device is not only sufficient, it may be preferable since it is less attributable than a missile-borne device. Much of the preoccupation with missile-borne devices seems to be a hangover in the media and some analysts still thinking along the lines of the Cold War. If one really believes North Korea is irrational and not susceptible to retaliatory deterrence, then one should worry more about the boat-borne nuclear weapons already accessible to the North Koreans. Their declared policy – for what it is worth – appears to be of retaliatory deterrence, not of a first strike.

Q: What about the possibility of the North striking South Korea or Japan with nuclear weapons?

A: Although North Korea has missiles — their Nodong and Scuds — which could target Japan and South Korea, there remains the technical challenge of miniaturizing and mounting the nuclear warheads on these missiles and bringing the system up to a reasonable level of reliability, both in terms of a functional robust warhead and a high targeting accuracy. But again, the main issue is not technical: why would the Pyongyang invite national suicide by launching such an attack?   As I mentioned earlier, if the North Koreans really wanted to do such a strike, they may have done so already using more primitive delivery vehicles. They do not need to develop a complicated and (at least, initially) unreliable missile-borne delivery system to carry out a nuclear strike.

Q: *Does the Aegis midcourse missile defense system provide an effective defense against such missiles?*

A: The Aegis sea-based midcourse missile defense system would not be suitable for defense of South Korea since the attacking North Korean missiles would not reach into space for any substantial length of time if at all — the Aegis SM-3 defense interceptors attempt to strike the incoming missiles in space. The time-line for a North Korean missile to reach South Korea is also very short, on the order of a few minutes so there is very little time to generate a firing solution. South Korea and Japan do have Patriot terminal missile defenses which attempt to intercept the warhead during descent or re-entry phase.

The Achilles’ Heel of the Aegis SM-3 system — indeed of “midcourse” missile defense, in general, is that it is straightforward to defeat the system using cheap decoy warheads. The system simply does not have a robust ability to discriminate a genuine warhead from decoys and other countermeasures.   Because the intercepts take place in the vacuum of space, the heavy warhead and light decoys travel together, confusing the system’s sensors. The Pentagon’s own scientists at the Defense Science Board said as much in 2011, as did the National Academy of Sciences earlier this year.

Additionally, the system has *never* been successfully tested in realistic conditions stressed by the presence of decoys or other countermeasures. The Aegis system is ship-based and is known to not work beyond a certain sea-state: as you might imagine, it becomes too risky to launch the interceptors if the ship is pitching wildly.

The enormous funds wasted on midcourse missile defense systems could have been much better spent on the coast-guard and port-security.

Q: *But is there a missile defense system that could provide an effective defense against such missiles?*

A: A missile defense system that would work better than the current systems being fielded – but still imperfectly – would be a surface-based boost-phase system. This system attempts to intercept the burning missile on its way up, before any decoys or warheads have been released.  Strangely, we are not developing it! We appear to be deliberately ignoring the one architecture of missile defense that has good chance of working against the North Korean threat  The recent National Academy of Sciences report came out against surface-based boost-phase missile defense – but only because they considered a “strawman” set of boost-phase interceptors that would not have the capability to work well. Other surface-based boost-phase interceptors would be more capable, and would provide a better defense than the midcourse system that is now being irrationally fielded.

However, no matter which missile defense system exists one must consider whether it makes sense to create incentives for our enemy to take their nuclear devices off of missiles and mate them to other delivery systems. e.g. A “functional” missile defense to counter North Korea’s missiles (e.g. a surface-based boost-phase system) could encourage Pyongyang to more urgently develop a ship-borne nuclear device instead. Since such a weapon is more difficult to detect and attribute to a given country, our adversaries may be less inhibited in using it as compared to an easily detected missile, which has a clear point of origin. (U.S. satellites continually monitor the globe for missile launches.) So if a missile defense encouraged our adversaries to exchange even a single missile-borne nuclear weapon for a ship-borne one, our security may actually decrease, overall. Of course, an adversary might develop these alternate delivery methods in any case, but creating incentives for them to do so is probably not in our interest.

The smartest course of action, of course, is to discourage and dissuade our adversaries from obtaining nuclear weapons in the first place. (Once they obtain nuclear weapons we will be deterred, no matter the type of missiles defenses in play.)

As outlined by Joel Wit, it seems the administration’s policy of “strategic patience” may have failed in this regard.

Q: *But is there any plausible way to de-nuclearize North Korea?*

A: It may well be too late already: it is unlikely that the North Koreans would willingly give up their nuclear weapons when they feel threatened, and are under increasingly heavy sanctions which in their eyes amount to economic warfare. As Mike Elleman argues, the US and allied nations could consider scaling back “their collective reaction to North Korean provocations that do not pose an immediate or significant threat and instead preserve their punitive responses for those activities that are most threatening, such as the February 12 nuclear test or future flight tests of long-range ballistic missiles.” Any future space launches probably ought not be met with further punitive sanctions, because such measures corner the regime and may lead, as we’ve seen, to an escalating spiral of provocations.

The North Koreans may also be reading from our own playbook: for instance, the 1995 US STRATCOM report “Essentials of Post-Cold War Deterrence” states: “it hurts to portray ourselves as too fully rational and cool-headed. The fact that some elements may appear to be potentially ‘out of control’ can be beneficial to creating and reinforcing fears and doubts within the minds of an adversary’s decision makers. This essential sense of fear is the working force of deterrence. That the US may become irrational and vindictive if its vital interests are attacked should be part of the national persona we project to all adversaries.” It appears that the North Korean leadership may have taken that particular paragraph to heart.

Also, in my view, it may not have been helpful that our latest Nuclear Posture Review (NPR) — from 2010 — implicitly qualified states like North Korea and Iran as possible targets of our nuclear weapons. In fact, former Secretary of Defense Robert Gates was rather explicit: “I actually think that the NPR has a very strong message for both Iran and North Korea, because whether it’s in declaratory policy or in other elements of the NPR, we essentially carve out states like Iran and North Korea that are not in compliance with NPT. And basically, all options are on the table when it comes to countries in that category.”

Lastly, former Director of Los Alamos National Labs, Dr. Siegfried Hecker, who has visited North Korea seven times over the last decade, including North Korean nuclear facilities, explains how the 1994 Agreed Framework deal with North Korea fell apart: “… the Agreed Framework was opposed immediately by many in Congress who believed that it rewarded bad behavior. Congress failed to appropriate funds for key provisions of the pact, causing the United States to fall behind in its commitments almost from the beginning. … [In 2002,] the Bush administration killed the Agreed Framework for domestic political reasons and because it suspected Pyongyang of cheating by covertly pursuing uranium enrichment. Doing so traded a potential threat that would have taken years to turn into bombs for one that took months, dramatically changing the diplomatic landscape in Pyongyang’s favor. … ***We found that Pyongyang was willing to slow its drive for nuclear weapons only when it believed the fundamental relationship with the United States was improving, but not when the regime was threatened***.” [emphasis added]

In crafting future policy to address the North Korean nuclear threat it may be worth heeding Dr. Hecker’s advice.

## Dr. Jacques Hymans

***Jacques E.C. Hymans is associate professor of international relations at the University of Southern California***

Q: *Your explanation as to why North Korea decided to pursue nuclear weapons is rooted in the emotional and psychological – that the perceived need for nuclear weapons is not the result of a cost-benefit analysis of the security environment but follows from the kind of national identity to which North Korean leadership ascribes. As North Korea’s “key comparison other,” isn’t there a unique potential for the United States to change North Korea’s desire for nuclear weapons, even with the Kim Dynasty remaining for some time? If so, what would this require from the United States?*

A: The decision by any state’s leaders to seek nuclear weapons is an emotional decision rooted in the fear of foreign enemies and in nationalist pride. The rulers of North Korea since its founding—father, son, and now grandson—have been under the influence of that explosive psychological cocktail. As a result, they have never given up on their pursuit of the bomb for the past half-century, albeit sometimes pressing the pause button for one reason or another.

The United States is certainly an enemy in Pyongyang’s eyes. But my analysis of North Korean leaders’ rhetoric over the decades indicates that they actually see the entire outside world as a more or less undifferentiated mass of antagonists. For instance, although it is often said that China is North Korea’s “best friend,” you wouldn’t know it from North Korean utterances. For instance, Kim Jong Un’s recent New Year’s Address, more than 4,000 words, did not mention China even once. Since the North Korean leadership is so standoffish toward all foreign countries, I find it doubtful that bilateral US-DPRK talks can bring about anything beyond a temporary reduction in North Korean saber-rattling. Kim Jong Un might yet surprise us, but I’m not holding my breath.

Q: *You have argued that sometimes a state’s inability to organize its resources effectively impedes its ability to fulfill its nuclear weapons aspirations. Is North Korea’s recent success with its nuclear test and satellite launch evidence that it is maturing in this regard, a testament to its determination to overcome its challenges, or something else?*

A: Despite the general progress of technology around the world, there has been a major fall-off in the efficiency of nuclear weapons projects since the 1970s. The most important cause of this is the poor organizational and management cultures of the states that have been trying to join the nuclear weapon state club. North Korea is a great example of this general trend. It has had tremendous trouble overcoming various technical hurdles that US experts assumed would not pose any serious difficulties at all. Indeed, it’s quite stunning that a country that the US believed probably already had nuclear weapons way back in the early 1990s still apparently doesn’t have a genuine nuclear military arsenal.

This is not to say that North Korea is incapable of making any technical progress toward its ultimate goal. Its nuclear and missile programs are not as pathetic as, say, Libya’s were. But even its recent tests can be said to have been “successful” only relative to the ridiculously low bar that Pyongyang had set with its prior disastrous test failures. For instance, although the North Koreans succeeded in putting a satellite into space last December, they broke the satellite in the process. And as former NASA engineer James Oberg has explained, this failure would likely be repeated if they tried to send up a nuclear warhead instead. In short, it’s important not to forget whom we’re dealing with here. This is a state that still hasn’t been able to open the monstrous Ryugyong Hotel in downtown Pyongyang, despite pouring hundreds of millions of dollars into the project over a quarter-century to fulfill the Dear Leader Kim Jong Il’s personal wish. When it comes to North Korean nukes, too, there is no doubt in my mind that we still have time—and probably quite a lot of time—before they are a real military threat.

## Ms. Masako Toki

***Masako Toki is the Education Project Manager and a Research Associate for the Nonproliferation Education Program at the James Martin Center for Nonproliferation Studies (CNS), Monterey, CA***

Q: In what ways has the recent situation on the Korean Peninsula affected public sentiment in Japan? Specifically, has there been an increase in perceived political support for reconsideration of Japan’s “virtual” nuclear status in favor of moving forward with weaponization of fissile materials – a de facto nuclear-weapon-state status? Or is Japan’s domestic political ”nuclear allergy” intact?

A: North Korea’s provocative and belligerent actions have inevitably pushed Japanese defense policy in the direction of a more hardline posture. Responding to North Korea’s nuclear weapon tests and missile launches, the Japanese government continues to try to make its missile defense more robust and sophisticated.

Also, the United States reiterated its security assurance for its allies with extended deterrence. U.S. extended deterrence has been the cornerstone of Japan’s security, even in the aftermath of the Cold War. The Japanese government is trying to complement extended deterrence with missile defense, which is widely viewed as consistent with Japan’s “exclusively defensive defense” policy.

At the same time, anti-nuclear sentiment among the general public in Japan has always outweighed support for developing Japan’s independent nuclear deterrence capability. Of course, Japan’s nuclearization debates once in a while resurface, especially in response to security threats posed by North Korea’s nuclear and missile programs, as well as China’s military modernization.

Nevertheless, anti-nuclear sentiment and nuclear allergy among the public is deep-rooted in Japan’s national identity and culture, and this is, to some extent, beyond political debates. However, the threshold of Japan’s nuclearization debate taboo seems to have been lowered as North Korea continues to develop and improve its nuclear and missile capability.

Having said that, in my opinion both external considerations (international treaties, the U.S.-Japan security alliance) and domestic restrictions (the three-non-nuclear principles, asserted by Parliament, that Japan will not possess or manufacture nuclear weapons or allow them on its territory; public opinion against nuclear weapons; and the atomic energy basic law, which limits nuclear activity to peaceful purposes) will keep Japan from ever developing its own nuclear deterrent. The only circumstance under which  Japan would really consider going nuclear is a decision to end the U.S.-Japan security treaty, which will not happen at least for the foreseeable future.

In sum, in my view, Japan will not develop its own nuclear weapons, it will continue to rely on the U.S. extended deterrence, and it will spend its resources improving its missile defense for long time, while advocating nuclear disarmament and nonproliferation as national policy. Even so, Japan will maintain its “moderate” nuclear disarmament policy, which actually does not push hard toward a world free of nuclear weapons, beyond the rhetorical.

Q: To what degree, if at all, is there trepidation in Japan over the perceived threat of North Korea attacking Japan with a nuclear weapon?

A: Very few people actually believe that North Korea will attack Japan with a nuclear weapon. Japan has quite strong faith in U.S. extended nuclear deterrence and perceives that North Korea understands the potential consequences if it attacks a U.S. ally with a nuclear weapon.

Therefore, instead of feeling trepidation, the public is more annoyed and upset by North Korea’s repeated and increasing provocative statements. The government cannot take any chances, and the defense minister has announced that the self-defense forces are at their highest level of readiness. Japan has lifted its self-imposed pacifist restrictions gradually, but steadily, to allow for more robust missile defense. So perhaps one of the direct, significant impacts on Japan’s security policy of North Korea’s nuclear threats would be a change in the interpretation of the constitution so that Japan can be allowed to exercise the right of collective self-defense.

The government of Japan needs to demonstrate its intention to protect its people. At this stage, deploying its missile defense is the most obvious such demonstration. However, the credibility of the country’s missile defense system is not clear, and the Japanese people’s trust in it is less than complete. So it is unclear whether deployment of missile defenses actually is mitigating civilians concern or fear. Beyond the issue of public support, missile defense opponents think a robust Japanese missile defense capability is not conducive to sustainable peace in East Asia.

Q: *Does the Japanese public and/or government express concern (and, if so, to what degree) about perceived terrorism and general social strife perpetrated by ethnic Koreans living in Japan?*

A: Generally speaking, the issue that the Japanese public most abhor about North Korea is the abductions of Japanese citizens from Japan by North Korean government agents that happened in the late 1970s and early 1980s.  It is believed that the victims were abducted to teach Japanese language and culture at North Korean spy schools.  While the North Korean government officially admitted the abductions in 2002 and insists that the issue has been resolved with the return of the five victims, the Japanese government adamantly claims that the issue has not been properly resolve. The Japanese government considers the abductions acts of terrorism that inflicted serious danger on Japanese citizens.  Therefore, Tokyo felt uneasy when the United States removed North Korea from the list of state sponsors of terrorism in October 2008 without seeing any improvement in the abduction issues. Tokyo has continued insisting that the abduction issue should not be left out from the Six-Party Talks. At the same time, there are opinions that abduction issues should be separated from nuclear and missile talks.

In addition, the General Association of Korean Residents in Japan (*Chosen Soren*), an organization with sympathetic ties to North Korea, has been involved in the illegal export of proliferation and missile-related goods and technologies from Japan to North Korea. However, due to Japan’s strengthened export controls and sanctions against North Korea, this activity has decreased significantly. Still, some *Chosen Soren* members are likely to be involved in procurement networks. Even so, it seems that the recent provocations by the North Korean government is generating discomfort and concerns among Korean people living in Japan.  In fact, some news media have reported that many Korean people in Japan (both South and North Koreans) are disgusted by the series of belligerent actions and statements taken and made by the North Korean government.

As Japanese animosity against North Korea continues to increase, Korean people in Japan are of course affected, directly and indirectly. Some ultra-right-wing Japanese groups express extreme levels of animosity toward both North and South Korea. In my opinion, the ultra-right-wing’s animosity against Korean people living in Japan does not generally relate to the general Japanese public’s fear of nuclear threats issued by the North Korean government.

## Expert Biographies

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***Jacques E.C. Hymans*** *is Associate Professor in the School of International Relations at the University of Southern California. His research focuses on international security affairs and on national identity. Hymans’ The Psychology of Nuclear Proliferation: Identity, Emotions, and Foreign Policy (Cambridge University Press, 2006) received the Edgar S. Furniss Book Award for best first book in national and international security, and the Alexander L. George Book Award for best book in political psychology. His second book, Achieving Nuclear Ambitions: Scientists, Politicians, and Proliferation was published by Cambridge University Press in 2012. Hymans has also published journal articles in such outlets as Foreign Affairs, International Security, Security Studies, the European Journal of International Relations, the Journal of East Asian Studies, and the Nonproliferation Review. He is an editorial board member of the Nonproliferation Review. He has wide-ranging geographical interests and has conducted in-depth case study research in Asia, Australia, Europe, Latin America, and North America.*

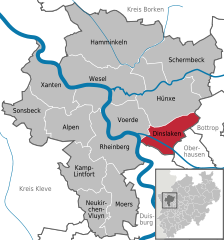
***Masako Toki*** *is Education Project Manager and Research Associate in the Nonproliferation Education Program at James Martin Center for Nonproliferation Studies (CNS), Monterey, CA. Her responsibilities include managing the Critical Issues Forum (CIF), nonproliferation education program for high school students and teachers in the United States and Russia. She develops online educational resources, including the NPT tutorial. She is also a member of the Japan Association of Disarmament Studies and the US-Japan Leadership Program (US-Japan Foundation).*

# A mysterious Iranian-run factory in Germany

# http://www.washingtonpost.com/rf/image_404h/2010-2019/WashingtonPost/2013/04/09/Foreign/Images/IRANFACTORY151365538878.JPGSource:http://www.washingtonpost.com/world/europe/a-mysterious-iranian-run-factory-in-germany/2013 /04/15/92259d7a-a29f-11e2-82bc-511538ae90a4\_story.html

Michael Birnbaum/TWP - European security officials and former workers have raised questions about whether the high-tech equipment and material at MCS Technologies, seen here in the picture, could have been part of a scheme to aid Iran’s rogue nuclear program.

DINSLAKEN, Germany — For years, mystery surrounded an Iranian-­controlled factory tucked away in this town of 70,000 in Germany’s industrial west.

The plant manufactured high-pressure gas tanks, but its managers seemed uninterested in making a profit. Potential investors were turned away. An expensive piece of machinery — precise enough to produce components for centrifuges and missiles — sat idle after a failed attempt to ship it to Iran. Finally, the factory, MCS Technologies, closed its doors late last month.

Since then, the mystery has taken another turn. European security officials and former workers have raised questions about whether the high-tech equipment and material at MCS could have been part of a scheme to aid Iran’s rogue nuclear program.

Questions have arisen about the tangled ownership of MCS, which until recently was tied to a former Iranian minister of intelligence, and about the blocked attempt to export sophisticated machinery to Iran.

MCS has never been cited for violating sanctions on trade with Iran, and one of the company’s owners said it has done nothing wrong.

“For sure, the Iranian people try all their best to turn around the sanctions, but not in my company,” said Eshagh Hajizadeh, a Canadian citizen who bought the assets of the company in 2011. “I never want anybody in this world to have access to nuclear. It is against humanity.”

With the United States, Germany and other Western countries trying to tighten sanctions on Iran to slow its nuclear program, the MCS mystery demonstrates the difficulty of tracking the flow of technology and material that have civilian and military applications.

“Where we have dual-use technology, it is not easy to control simply by checking goods,” said Wolfgang Schmitz, a spokesman for the German Customs Investigations Bureau. “You need more info about the contract and the possible criminal elements inside it.”

One of the dual-use materials at MCS was carbon fiber, which is often used in the aerospace and automotive fields because of its extreme strength, resistance to heat and light weight. MCS used carbon fiber to build high-pressure gas tanks for compressed natural gas and hydraulic systems. More than 2,600 pounds of the material still sits inside the plant.

Carbon fiber’s strength and heat resistance also make the material essential for advanced centrifuges. The cylindrical machines spin at supersonic speeds to enrich uranium, which can be used to fuel civilian nuclear plants or, at higher concentrations, to make fissile material for atomic weapons.

U.N. inspectors and intelligence officials say Iran has been trying to build large numbers of the advanced centrifuges, known as IR-2Ms, which enrich uranium much faster than its current generation of centrifuges.

But the officials say Iran has been scouring the world’s black markets for the vital carbon fiber. This year, suspicions that Tehran might have discovered a source for the material rose when Iran announced plans to install 3,000 of the advanced centrifuges at its main enrichment facility in Natanz in the central part of the country.

“The Iranians always exaggerate, but they clearly are getting better at making the machines,” said a Europe-based diplomat whose government tracks Iran’s procurement efforts. The official, who spoke on the condition of anonymity to discuss sensitive intelligence, said Iran’s attempts to buy carbon fiber are well documented.

**A web of connections**

Experts who have studied Iran’s clandestine procurement efforts say obtaining material and expertise from the German factory could have helped overcome bottlenecks that have slowed Tehran’s nuclear progress. A former sister company in Iran, Pars MCS, was designated by the Canadian government in 2010 as a possible contributor to “Iran’s proliferation-sensitive nuclear activities.”

Hajizadeh said that the German company had severed ties with Pars MCS and that business between the two companies had dwindled to a single contract since 2011. Two former employees said German engineers flew to Iran as recently as December 2011 to consult with Pars MCS. Hajizadeh said that only one German engineer went to Iran and that his only job was to service a machine sold to Pars MCS many years earlier.

Hajizadeh said MCS was shut down last month because it was losing $2 million to $3 million a year.

“Iran faces continual shortages of key dual-use goods for its centrifuge program,” said David Albright, a former U.N. nuclear inspector and president of the Institute for Science and International Security, a Washington organization that researches nuclear weapons programs. “Acquiring a foreign company can allow direct access to some of those goods.”

In 2003, Iranian-operated companies bought Mannesmann Cylinder Systems in Dinslaken and changed the name to MCS. The company had been in business since 1887, but it was bankrupt, and its employees hoped that new owners meant a new beginning.

Workers quickly found that the new managers seemed uninterested in running a profitable business. Instead, three former workers said in interviews, more attention was paid to starting the sister company in Iran, Pars MCS, to manufacture gas tanks there.

“Nothing was invested here,” said Peter Fichtner, who worked at MCS from 1997 until its final day, March 29.

Over the decade, managers shuttled in and out of MCS. Many of them had ties to the Iranian government, according to Emanuele Ottolenghi, a senior fellow with the Washington think tank Foundation for Defense of Democracies, who investigated the web of connections between the company and the government.

Until 2011, the company was owned by Reyco, a German affiliate of an Iranian firm called Rey Investment, according to company registration documents. Rey Investment is owned by a religious organization and led by Mohammad Reyshahri, a former Iranian minister of intelligence. The parent company’s board is filled with members of Iran’s political elite.

The former “owners were not just Iranian businessmen. Some of them were clearly affiliated with the Iranian regime or had links to Iran’s Ministry of Intelligence or Revolutionary Guard,” said Ottolenghi, referring to the elite military unit that helps oversee Iran’s missile programs.

Hajizadeh and another Canadian-Iranian businessman purchased MCS’s assets in 2011, cutting ties between the German operation and Pars MCS and Reyco. Records show that Hajizadeh remains a manager of Reyco, but he said it was no longer conducting business.

As a German company, MCS was able to buy carbon fiber from Japanese and French producers. The former workers said the material was so tightly restricted and monitored that even waste was weighed and recorded.

But when a reporter visited the shuttered plant recently, 2,600 pounds of carbon fiber was sitting in cardboard boxes on the factory floor. Experts say that amount of carbon fiber could allow Iran to build more than 550 top-of-the-line centrifuges. But Hajizadeh said his hope was to recoup some money by returning the material to the manufacturers, Toho Tenax of Japan and Toray of France.

**Failed shipment effort**

The factory also contains a specialized machine used to manufacture lightweight, precision parts. The apparatus, called a flow-forming machine, also can produce components for long-range missiles, rockets and centrifuges.

In 2004, MCS tried to ship the machine to its sister company in Iran, according to an account from the German Foreign Ministry that was provided to The Washington Post. The Foreign Ministry refused to allow the equipment out of the country, and it has since sat, rarely used, at the Dinslaken plant.

“This machine is very sensitive,” said Benedict Nillies, the head of the technical department at Leifeld Metal Spinning, which manufactures the equipment. “The German BND,” Germany’s version of the CIA, “watches these machines very carefully,” he added.

The Iranians who controlled MCS at the time were so determined to send the machine to Iran that they asked municipal officials in Dinslaken to intercede with the German Foreign Ministry. “They pleaded for the mayor to intervene with the responsible authorities to allow export permission to Iran,” said Thomas Pieperhoff, a top official in the mayor’s office. The Foreign Ministry told the mayor’s office not to intervene, and the machine was not sent.

Hajizadeh said Pars MCS wanted the machine to manufacture high-pressure tanks more efficiently.

In early 2004, two similar machines from a Spanish company were discovered in Libya after Tripoli abandoned its nuclear weapons program. The machines had been delivered by the black-market network run by A.Q. Khan, a rogue Pakistani nuclear scientist.

At the end of March, as the plant was shutting down, a shipment of lightweight, carbon-  
fiber-wrapped gas tanks was sent to Dubai, according to former employees and shipping manifests documenting the transaction.

Dubai is a frequent transit point for getting restricted material into nearby Iran, experts say. Concerned about the contents, Belgian customs officials pulled the shipment off a vessel in the port of Antwerp and searched it, according to a European security official speaking on the condition of anonymity because he was not authorized to discuss an ongoing operation.

The alarm turned out to be another testament to the difficulty of monitoring dual-use materials. The security officials said that the shipment was perfectly legal — and that it could have proceeded even if it were directly en route to Iran.

# After the apocalypse: Haunting photographs show the sprawling ruins of Chernobyl 27 years after nuclear disaster

# Source:http://www.dailymail.co.uk/news/article-2314041/Chernobyl-nuclear-disaster-Eerie-photographs-Helene-Veilleux.html

* **Photographer Hélène Veilleux was allowed into the Zone Of Alienation surrounding the Chernobyl nuclear plant**
* **Her pictures show the desolate area covering 1,000 square miles that was evacuated after blast in April 1986**
* **Schools, shops, fairgrounds, swimming pools and homes - all are slowly falling into ruins as zone returns to forest**

Scores of abandoned gas masks covering a shop floor, rusted carriages of a motionless big wheel, neglected wallpaper falling off the wall of an empty family home...

These haunting images offer a rare glimpse into the life that stopped still in Chernobyl and neighboring city Pripyat 27 years ago, when a test at a nuclear power reactor went wrong.

It was the worst nuclear disaster in history, and so dangerous was the fallout that the Ukrainian government evacuated 350,000 residents, creating an Exclusion Zone where time has stood still ever since.

#### **Regulating Japanese Nuclear Power in the Wake of the Fukushima Daiichi Accident**

Source: http://blogs.fas.org/wp-content/uploads/2013/05/Regulating\_Japanese\_Nuclear\_13May13.pdf

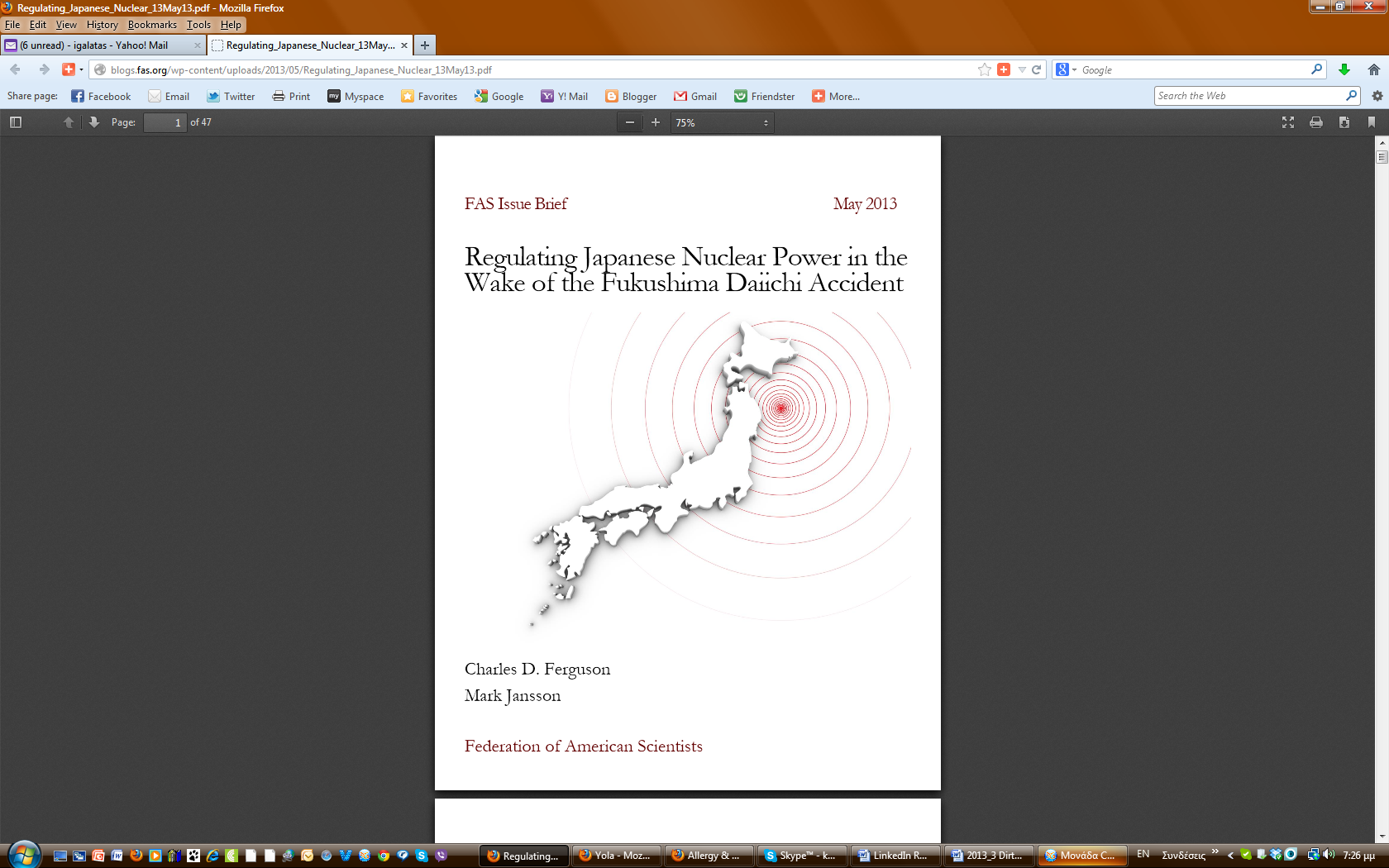
**Executive Summary**

The accident at the Fukushima Daiichi nuclear power plant in 2011 was preventable. The Great East Japan earthquake and the tsunami that followed it were unprecedented events in recent history, but they were not altogether unforeseeable. Stronger regulation across the nuclear power industry could have prevented many of the worst outcomes at Fukushima Daiichi and will be needed to prevent future accidents.

Poor planning led to the underutilization of resources and compounded the problem at Fukushima Daiichi.

This report reviews some of the major problems leading up to the accident and the proposed regulatory reforms, including an overhaul of the nuclear regulatory bureaucracy and specific safety requirements that have been proposed.

**Re-organizing the Nuclear Regulation Bureaucracy**

The previous bureaucratic alignment facilitated “regulatory capture” by the nuclear power industry, resulting in substandard and weakly enforced rules to ensure safety. The primary agency in charge of regulation, the Nuclear and Industrial Safety Agency (NISA), was routinely overpowered by the industry interests represented in the Ministry of Economy Trade and Industry (METI) that housed it while also holding responsibility for promoting the nuclear power industry. Another problem that the Fukushima accident exposed was the poorly defined responsibilities of other agencies that had a role in developing regulation and in managing accident scenarios.

The formation of the Nuclear Regulatory Authority (NRA) within the Ministry of Environment is a vitally important step towards establishing a truly independent regulatory body that can more aggressively advance safety. Now that this step has been taken, it will be important for the Japanese government and the NRA to establish the necessary legal and policy frameworks to ensure that the agency functions effectively. To that end, we recommend the following.

• Japan should consider exempting the NRA from the practice of rotating government employees between jobs every several years and expedite the proper and entire incorporation of Japan Nuclear Energy Safety Organization (JNES) and all technical support organizations into the NRA.

• The NRA must take a leading role in working with industry to professionalize the workforce through proper training, hiring practices, and compensation. It will be incumbent on the rest of the Japanese government to fully support it in this regard.

• Japan should review and, as needed, strengthen whistleblower protections that apply to both industry and government employees. Within the NRA, it should stand up an Inspector General’s office (or functional equivalent) to provide necessary oversight.

**Managing the “revolving door” dilemma**

Another significant problem in Japan was the potential for conflicts of interests to arise for regulators who were planning to seek employment in industry following their service as a regulator.

The cultural tradition of “amakudari” (descent from heaven) in which senior bureaucrats would assume high paying jobs in industry following retirement from government service epitomized this problem. However, the “revolving door” dilemma in which personnel move between jobs in industry and in regulatory bodies affects all industry-regulator relationships, given the demand on both sides for special and technical expertise.

The proposed prohibition, with an exception for the first five years after implementation, that bans NRA personnel from returning to jobs in government agencies that promote nuclear power could help mitigate the potential for conflicts of interests to surface within government, but this is a stricter rule than government employment practices in the United States and many other countries.

The fact that there is no similar ban preventing NRA personnel from assuming jobs in industry, though disappointing to some, is not inconsistent with practices in other countries. The limitations on regulatory personnel seeking jobs in industry are also consistent with practices elsewhere.

Overall, complete isolation of the regulator from industry is neither practical

nor necessarily desirable. A few additional recommendations to prevent individual conflicts of interests include the following.

• Consider developing more robust alternative means to industry experience for developing the technical expertise required for effective regulation so that the NRA is not populated exclusively by former industry workers.

• To bring even greater transparency to the matter of regulators seeking jobs in industry, Japan could consider establishing rules that require industry firms to report that they have been contacted by outside parties, e.g., consultancies, about hiring specific NRA personnel.

• Because conflicts of interests and lax oversight are more likely to become a problem in a regulatory workforce that is demoralized, the NRA should proactively seek input from other regulatory bodies such as the U.S. Nuclear Regulatory Commission on how to improve employee satisfaction.

**Specific Safety Measures**

A number of specific safety upgrades are under consideration to become industry - wide standards for all nuclear power plants. These include requiring nuclear power plants to install filtered vents above reactor containment vessels, to establish earthquake-resistant control centers, to build secondary

control rooms to use in the event that the primary control rooms becomes unusable, and to limit reactor life to no more than forty years. We also consider the issue of restarting nuclear reactors in Japan to meet energy demands.

In assessing these recommendations, we drew heavily from the experience of the United States and Europe. Overall, we further recommend that the NRA embrace a dynamic approach that continually assesses risks rather than adopt a deterministic approach that may give a false impression to the public and may place undue costs on continuance of nuclear power plants that can operate safely.

The NRA would best be able to work with regulatory agencies in other countries by harmonizing its regulatory approach with the risk informed and probabilistic safety assessment methodology followed in these countries’ regulatory agencies. Other findings and recommendations are as follows.

• Our assessment is that the U.S. decision on whether to require filtered vents should be based on achieving safety performance goals determined by probabilistic risk assessments and risk informed regulation. These goals can be met in different ways. Regulatory bodies in other countries such as Japan can and should apply this approach to their decisions on whether to require filtered vents at various plants.

• The NRA should decide on whether or not to issue a license to operate nuclear plants beyond 40 years based on safety assessments guided by risk informed regulation. We urge that such decisions not be influenced by political considerations. Nonetheless, we understand that utilities may decide to not operate a nuclear plant, even if that plant receives a license extension, because of other economic considerations. In particular, the cost of safety upgrades may be too prohibitive to permit economically competitive operation of a plant.

• We recommend that Japan and the United States work together to investigate strengthening plant safety with an eye to determining whether various plants can operate beyond 60 years.

• We recommend that any decision to restart nuclear reactors in Japan not be unduly influenced by political decisions. In particular, the NRA should follow a risk informed approach when examining each individual plant. A defense-in-depth safety approach should be the overarching philosophy. While each defensive layer is individually imperfect, the combined functioning of the layers together should be designed to meet safety performance objectives to keep the risk to the public to an acceptably low level.

►**Read the full report at the source link**

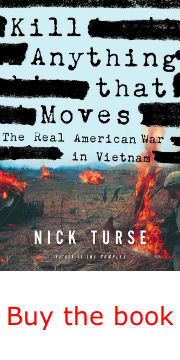
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| The Impact of Communication Materials on Public Responses to a Radiological Dispersal Device (RDD) Attack  **By M. Brooke Rogers, Richard Amloˆt, and G. James Rubin**  Source: Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science; Volume 11, Number 1, 2013  **Abstract**  It is a common assumption that, in the event of a chemical, biological, radiological, or nuclear (CBRN) attack, a well-prepared and informed public is more likely to follow official recommendations regarding the appropriate safety measures to take. We present findings from a UK study investigating the ability of crisis communication to influence perceptions of risk and behavioral intentions in the general public in response to CBRN terrorism. We conducted a focus group study involving a scenario presented in mock news broadcasts to explore levels of public knowledge, information needs, and intended behavioral reactions to an attack involving an overt radiological dispersal device (RDD), or dirty bomb.We used the findings from these focus groups to design messages for the public that could be presented in a short leaflet. We then tested the effects of the leaflet on reactions to the same scenario in 8 further focus groups. The impact of the new messages on levels of knowledge, information needs, and intended compliance with official recommendations was assessed. The provision of information increased the perceived credibility of official messages and increased reported levels of intended compliance with advice to return to normal/stop sheltering, attend a facility for assessment and treatment, and return to a previously contaminated area after decontamination of the environment has taken place. Should a real attack with an RDD occur, having pretested messages available to address common concerns and information needs should facilitate the public health response to the attack. |

Tomgram: Nick Turse, Israel, Iran, and the Nuclear Freight Train

Source:http://www.tomdispatch.com/post/175698/tomgram%3A\_nick\_turse%2C\_israel%2C\_iran%2C\_and\_the\_nuclear\_freight\_train/?utm\_source=TomDispatch&utm\_campaign=a2c2362735-TD\_Turse5\_12\_2013&utm\_medium=email&utm\_term=0\_1e41682ade-a2c2362735-308885509#more

Has a weapon ever been invented, no matter how terrible, and not used?  The crossbow, the dreadnought, poison gas, the tank, the landmine, chemical weapons, napalm, the B-29, the drone: all had their day and for some that day remains now.  Even the most terrible weapon of all, the atomic bomb, that city-buster, that potential civilization-destroyer, was used as soon as it was available.  Depending on your historical interpretation, it was either responsible for ending World War II in the Pacific or rushed into action before that war could end.  In either case, it launched the atomic age.

During the Cold War, the two superpowers, the U.S. and the Soviet Union, relied on a strategy that used to be termed, without irony, “mutual assured destruction” or MAD.  Its intent was simple enough: to hold off a planetary holocaust by threatening to commit one.  With their massive nuclear arsenals, those two imperial states held each other and everyone else on the planet hostage.  Each safely secured more than enough nukes to be able to absorb a “first strike” that would devastate its territory, leaving possibly tens of millions of its citizens dead or wounded, and still return the (dis)favor.

After the Soviet Union disappeared in 1991, nuclear weapons did, too -- without going away. The American and Russian arsenals, and the nuclear geography that underlay them, remained in place, just largely unremarked upon.  In the meantime, the weaponry itself spread.  In those years, the last superpower, which seldom discussed its own arsenal, selectively focused its energies on containing the [](http://www.amazon.com/dp/0805086919/ref=nosim/?tag=tomdispatch-20)spread of nuclear weaponry in three nations: the first was Pakistan some part of whose ever-growing nuclear arsenal it feared might fall into the hands of extreme Islamic fundamentalists in a land Washington was in the process of destabilizing via a war in neighboring Afghanistan and a CIA drone campaign in its tribal borderlands; the second was North Korea, a country encouraged in its quest for nuclear weapons by watching the U.S. take down two autocrats, Saddam Hussein and Muammar Qaddafi, who gave up their nuclear programs prior to U.S. interventions; and the third was Iran, which had a nuclear program (started by the U.S. in an era when the country was considered our bulwark in the Persian Gulf), but as far as anyone knows no plans to weaponize it.  In the meantime, Washington (and so the American media) simply ignored the very existence of Israel’s massive nuclear arsenal and actually aided the further development of the Indian nuclear program.  In these years, it also threatened or, in the case of Iraq, a country that no longer had a nuclear program, actually launched what Jonathan Schell has called “disarmament wars.”

That the spread of nuclear weapons, whatever the country, is a danger to us all is obvious.  Who exactly will use such weapons next and where remains unknown.  But there is no reason to believe that, sooner or later, nuclear weapons -- which have now spread to nine countries -- and are likely to spread further, will not be used again.

Recently, a Texas-based nonprofitgot a lot of publicity by announcing that it had fired the first handgun ever made almost totally by a 3-D printer.  This act, modest enough in itself, nonetheless highlights a trend of our time.  Weaponry that once only a large state, mobilizing scientists, industrial power, and resources could produce can now be made by ever-smaller states -- say North Korea with limited resources and a malnourished populace.  Similarly, weapons once made by large companies can now be assembled by individuals.  Or put another way, ever more powerful weaponry is increasingly available to ever less powerful states and even non-state actors.  It was, for instance, the Aum Shinrikyo cult that, in 1995, produced sarin nerve gas -- “the poor man’s atomic bomb” -- in its own laboratory and used it in the Tokyo subways, killing 13, just as in the U.S. anthrax began arriving in the mail a week after 9/11, killing five people.

We don’t know where or why a nuclear weapon will be used.  We don’t know whether it will be a North Korean, South Korean, Indian, Pakistani, Lebanese, Iranian, Israeli, or even American city that will be hit. All we should assume is that, as long as such weapons are developed, amassed, and stored for use, one day they will be used with consequences that, as Nick Turse, author of the bestselling Kill Anything That Moves, reports today, are -- even for those who have studied the atomic bombings of Hiroshima and Nagasaki -- beyond imagining.

**Tom**

**Nuclear Terror in the Middle East** – **Lethality Beyond the Pale**

**By Nick Turse**

Source: same as above

In those first minutes, they’ll be stunned. Eyes fixed in a thousand-yard stare, nerve endings numbed. They’ll just stand there. Soon, you’ll notice that they are holding their arms out at a 45-degree angle. Your eyes will be drawn to their hands and you’ll think you mind is playing tricks. But it won’t be. Their fingers will start to resemble stalactites, seeming to melt toward the ground. And it won’t be long until the screaming begins. Shrieking. Moaning. Tens of thousands of victims at once. They’ll be standing amid a sea of shattered concrete and glass, a wasteland punctuated by the shells of buildings, orphaned walls, stairways leading nowhere.

This could be Tehran, or what’s left of it, just after an Israeli nuclear strike.

Iranian cities -- owing to geography, climate, building construction, and population densities -- are particularly vulnerable to nuclear attack, according to a new study, “Nuclear War Between Israel and Iran: Lethality Beyond the Pale,” published in the journal Conflict & Health by researchers from the University of Georgia and Harvard University. It is the first publicly released scientific assessment of what a nuclear attack in the Middle East might actually mean for people in the region.

Its scenarios are staggering.  An Israeli attack on the Iranian capital of Tehran using five 500-kiloton weapons would, the study estimates, kill seven million people -- 86% of the population -- and leave close to 800,000 wounded.  A strike with five 250-kiloton weapons would kill an estimated 5.6 million and injure 1.6 million, according to predictions made using an advanced software package designed to calculate mass casualties from a nuclear detonation.

Estimates of the civilian toll in other Iranian cities are even more horrendous.  A nuclear assault on the city ofArak, the site of a heavy water plant central to Iran’s nuclear program, would potentially kill 93% of its 424,000 residents.  Three 100-kiloton nuclear weapons hitting the Persian Gulf port of Bandar Abbas would slaughter an estimated 94% of its 468,000 citizens, leaving just 1% of the population uninjured.  A multi-weapon strike on Kermanshah, a Kurdish city with a population of 752,000, would result in an almost unfathomable 99.9% casualty rate.

Cham Dallas, the director of the Institute for Health Management and Mass Destruction Defense at the University of Georgia and lead author of the study, says that the projections are the most catastrophic he’s seen in more than 30 years analyzing weapons of mass destructionand their potential effects.  “The fatality rates are the highest of any nuke simulation I’ve ever done,” he told me by phone from the nuclear disaster zone in Fukushima, Japan, where he was doing research.  “It’s the perfect storm for high fatality rates.”

Israel has never confirmed or denied possessing nuclear weapons, but is widely known to have up to several hundred nuclear warheads in its arsenal.  Iran has no nuclear weapons and its leaders claim that its nuclear program is for peaceful civilian purposes only.  Published reports suggest that American intelligence agencies and Israel’s intelligence service are in agreement: Iran suspended its nuclear weapons development program in 2003.

Dallas and his colleagues nonetheless ran simulations for potential Iranian nuclear strikes on the Israeli cities of Beer Sheva, Haifa, and Tel Aviv using much smaller 15-kiloton weapons, similar in strength to those dropped by the United States on the Japanese cities of Hiroshima and Nagasaki in August 1945.  Their analyses suggest that, in Beer Shiva, half of the population of 209,000 would be killed and one-sixth injured.  Haifa would see similar casualty ratios, including 40,000 trauma victims.  A strike on Tel Aviv with two 15-kiloton weapons would potentially slaughter 17% of the population -- nearly 230,000 people.  Close to 150,000 residents would likely be injured.

These forecasts, like those for Iranian cities, are difficult even for experts to assess.  “Obviously,accurate predictions of casualty and fatality estimates are next to impossible to obtain,” says Dr. Glen Reeves, a longtime consultant on the medical effects of radiation for the Defense Department’s Defense Threat Reduction Agency, who was not involved in the research.  “I think their estimates are probably high but not impossibly so.”

According to Paul Carroll of the Ploughshares Fund, a San Francisco-based foundation that advocates for nuclear disarmament, “the results would be catastrophic” if major Iranian cities were attacked with modern nuclear weapons.  “I don’t see 75% [fatality rates as] being out of the question,” says Carroll, after factoring in the longer-term effects of radiation sickness, burns, and a devastated medical infrastructure.

According to Dallas and his colleagues, the marked disparity between estimated fatalities in Israel and Iran can be explained by a number of factors.  As a start, Israel is presumed to have extremely powerful nuclear weapons and sophisticated delivery capabilities including long-range Jericho missiles, land-based cruise missiles, submarine-launched missiles, and advanced aircraft with precision targeting technology.

The nature of Iranian cities also makes them exceptionally vulnerable to nuclear attack, according to the Conflict & Health study.  Tehran, for instance, is home to 50% of Iran’s industry, 30% of its public sector workers, and 50 colleges and universities.  As a result, 12 million people live in or near the capital, most of them clustered in its core.  Like most Iranian cities, Tehran has little urban sprawl, meaning residents tend to live and work in areas that would be subject to maximum devastation and would suffer high percentages of fatalities due to trauma as well as thermal burns caused by the flash of heat from an explosion.

Iran’s topography, specifically mountains around cities, would obstruct the dissipation of the blast and heat from a nuclear explosion, intensifying the effects.  Climatic conditions, especially high concentrations of airborne dust, would likely exacerbate thermal and radiation casualties as well as wound infections.

**Nuclear Horror: Then and Now**

The first nuclear attack on a civilian population center, the U.S. strike on Hiroshima, left that city “uniformly and extensively devastated,” according to a study carried out in the wake of the attacks by the U.S. Strategic Bombing Survey.  “Practically the entire densely or moderately built-up portion of the city was leveled by blast and swept by fire... The surprise, the collapse of many buildings, and the conflagration contributed to an unprecedented casualty rate.”  At the time, local health authorities reported that 60% of immediate deaths were due to flash or flame burns and medical investigators estimated that 15%-20% of the deaths were caused by radiation.

Witnesses “stated that people who were in the open directly under the explosion of the bomb were so severely burned that the skin was charred dark brown or black and that they died within a few minutes or hours,” according to the 1946 report.  “Among the survivors, the burned areas of the skin showed evidence of burns almost immediately after the explosion.  At first there was marked redness, and other evidence of thermal burns appeared within the next few minutes or hours.”

Many victims kept their arms outstretched because it was too painful to allow them to hang at their sides and rub against their bodies.  One survivor recalled seeing victims “with both arms so severely burned that all the skin was hanging from their arms down to their nails, and others having faces swollen like bread, losing their eyesight. It was like ghosts walking in procession…  Some jumped into a river because of their serious burns. The river was filled with the wounded and blood.”

The number of fatalities at Hiroshima has been estimated at 140,000.  A nuclear attack on Nagasaki three days later is thought to have killed 70,000.  Today, according to Dallas, 15-kiloton nuclear weapons of the type used on Japan are referred to by experts as “firecracker nukes” due to their relative weakness.

In addition to killing more than 5.5 million people, a strike on Tehran involving five 250-kiloton weapons -- each of them 16 times more powerful than the bomb dropped on Hiroshima -- would result in an estimated 803,000 third-degree burn victims, with close to 300,000 others suffering second degree burns, and 750,000 to 880,000 people severely exposed to radiation. “Those people with thermal burns over most of their bodies we can’t help,” says Dallas.  “Most of these people are not going to survive… there is no saving them.  They’ll be in intense agony.”  As you move out further from the site of the blast, he says, “it actually gets worse.  As the damage decreases, the pain increases, because you’re not numb.”

In a best case scenario, there would be 1,000 critically injured victims for every surviving doctor but “it will probably be worse,” according to Dallas.  Whatever remains of Tehran’s healthcare system will be inundated with an estimated 1.5 million trauma sufferers.  In a feat of understatement, the researchers report that survivors “presenting with combined injuries including either thermal burns or radiation poisoning are unlikely to have favorable outcomes.”

Iranian government officials did not respond to a request for information about how Tehran would cope in the event of a nuclear attack.  When asked if the U.S. military could provide humanitarian aid to Iran after such a strike, a spokesman for Central Command, whose area of responsibility includes the Middle East, was circumspect.  “U.S. Central Command plans for a wide range of contingencies to be prepared to provide options to the Secretary of Defense and the President,” he told this reporter.  But Frederick Burkle, a senior fellow at the Harvard Humanitarian Initiative and Harvard University’s School of Public Health, as well as a coauthor of the just-published article, is emphatic that the U.S. military could not cope with the scale of the problem.  “I must also say that no country or international body is prepared to offer the assistance that would be needed,” he told me.

Dallas and his team spent five years working on their study**.**  Their predictions were generated using a declassified version of a software package developed for the Defense Department’s Defense Threat Reduction Agency, as well as other complementary software applications.  According to Glen Reeves, the software used fails to account for many of the vagaries and irregularities of an urban environment.  These, he says, would mitigate some of the harmful effects.  Examples would be buildings or cars providing protection from flash burns.  He notes, however, that built-up areas can also exacerbate the number of deaths and injuries.  Blast effects far weaker than what would be necessary to injure the lungs can, for instance, topple a house.  “Your office building can collapse… before your eardrums pop!” notes Reeves.

The new study provides the only available scientific predictions to date about what a nuclear attack in the Middle East might actually mean.  Dallas, who was previously the director of the Center for Mass Destruction Defense at the Centers for Disease Control and Prevention, is quick to point out that the study received no U.S. government funding or oversight.  “No one wanted this research to happen,” he adds.

**Rattling Sabers and Nuclear Denial**

Frederick Burkle points out that, today, discussions about nuclear weapons in the Middle East almost exclusively center on whether or not Iran will produce an atomic bomb instead of “focusing on ensuring that there are options for them to embrace an alternate sense of security.”  He warns that the repercussions may be grave.  “The longer this goes on the more we empower that singular thinking both within Iran and Israel.”

Even if Iran were someday to build several small nuclear weapons, their utility would be limited.  After all, analysts note that Israel would be capable of launching a post-attack response which would simply devastate Iran.  Right now, Israel is the only nuclear-armed state in the Middle East.  Yet a preemptive Israeli nuclear strike against Iran also seems an unlikely prospect to most experts.

“Currently, there is little chance of a true nuclear war between the two nations,” according to Paul Carroll of the Ploughshares Fund.  Israel, he points out, would be unlikely to use nuclear weapons unless its very survival were at stake. “However, Israel’s rhetoric about red lines and the threat of a nuclear Iran are something we need to worry about,” he told me recently by email.   “A military strike to defeat Iran’s nuclear capacity would A) not work B) ensure that Iran WOULD then pursue a bomb (something they have not clearly decided to do yet) and C) risk a regional war.”

Cham Dallas sees the threat in even starker terms.  “The Iranians and the Israelis are both committed to conflict,” he told me.  He isn’t alone in voicing concern.  “What will we do if Israel threatens Tehran with nuclear obliteration?... A nuclear battle in the Middle East, one-sided or not, would be the most destabilizing military event since Pearl Harbor,” wrote Pulitzer Prize-winning national security reporter Tim Weiner in a recent op-ed for Bloomberg News.  “Our military commanders know a thousand ways in which a war could start between Israel and Iran… No one has ever fought a nuclear war, however. No one knows how to end one.”

The Middle East is hardly the only site of potential nuclear catastrophe.  Today, according to the Ploughshares Fund, there are an estimated 17,300 nuclear weapons in the world.  Russia reportedly has the most with 8,500; North Korea, the fewest with less than 10.  Donald Cook, the administrator for defense programs at the U.S. National Nuclear Security Administration, recently confirmed that the United States possesses around 4,700 nuclear warheads.  Other nuclear powers include rivals India and Pakistan, which stood on the brink of nuclear war in 2002.  (Just this year, Indian government officials warned residents of Kashmir, the divided territory claimed by both nations, to prepare for a possible nuclear war.)  Recently, India and nuclear-armed neighbor China, which went to war with each other in the 1960s, again found themselves on the verge of a crisis due to a border dispute in a remote area of the Himalayas.

In a world awash in nuclear weapons, saber-rattling, brinkmanship, erratic behavior, miscalculations, technological errors, or errors in judgment could lead to a nuclear detonation and suffering on an almost unimaginable scale, perhaps nowhere more so than in Iran.  “Not only would the immediate impacts be devastating, but the lingering effects and our ability to deal with them would be far more difficult than a 9/11 or earthquake/tsunami event,” notes Paul Carroll.  Radiation could turn areas of a country into no-go zones; healthcare infrastructure would be crippled or totally destroyed; and depending on climatic conditions and the prevailing winds, whole regions might have their agriculture poisoned.  “One large bomb could do this, let alone a handful, say, in a South Asian conflict,” he told me.

“I do believe that the longer we have these weapons and the more there are, the greater the chances that we will experience either an intentional attack (state-based or terrorist) or an accident,” Carroll wrote in his email.  “In many ways, we’ve been lucky since 1945.  There have been some very close calls.  But our luck won’t hold forever.”

Cham Dallas says there is an urgent need to grapple with the prospect of nuclear attacks, not later, but now.  “There are going to be other big public health issues in the twenty-first century, but in the first third, this is it.  It’s a freight train coming down the tracks,” he told me. “People don’t want to face this.  They’re in denial.”

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# Turkey's nuclear ambitions

Source: http://thebulletin.org/web-edition/op-eds/turkeys-nuclear-ambitions

This month Turkey and Japan agreed to begin exclusive negotiations on constructing four nuclear power reactors at Sinop on the Black Sea. The deal marks the start of Turkey's second nuclear power project, after it reached a similar deal three years ago with a Russian consortium to construct four reactors at Akkuyu near the Mediterranean.

When Turkey decided in 2008 to move ahead with plans at Akkuyu, it stoked fears of nuclear proliferation in the region. In fact, though, Turkey appears to have neither the capability nor the desire to develop nuclear weapons. Nonetheless, the speed and tight budget with which it has been pursuing nuclear power pose risks. As Ankara seeks to build up an expensive new industry with limited funds, safety could be compromised, while weak regulations and export controls mean that nuclear materials could escape supervision.

**Peaceful purposes**

Far from being bellicose in intent, Turkey's nuclear program is a natural outgrowth of its energy needs and a desire to move away from reliance on foreign suppliers. Despite having identified Iran's ballistic missile and nuclear program as a threat in the 1990s, Turkey has not pursued its own nuclear weapons capability. Instead it has adopted a dual-pronged defense against the spread of weapons of mass destruction (WMD) in the region, one that rests on promoting international nonproliferation norms while also developing non-nuclear weapons. Turkey plans to develop missile defenses, PDF cruise missiles, and drones PDF to counter threats from ballistic missile and WMD emanating from the Middle East. These plans are underpinned, of course, by US and NATO guarantees to assist if Turkey faces a nuclear or chemical-weapons threat.

Ankara's nuclear weapons policies are independent from its civil nuclear efforts. It has had plans to establish a nuclear energy program since the 1960s. In fact, prior to the Russian deal, it had made five unsuccessful attempts to jump-start a program. Financing has been the biggest challenge: The estimated cost of construction in a "new nuclear state" ranges from $2 billion to $9 billion for each 1,000-megawatt plant.

**Foreign financing**

In contrast to some new nuclear states -- like the United Arab Emirates, which has ample financial resources -- Turkey until recently refused to cover any reactor-building costs with treasury guarantees, under which a government commits to making up the difference if revenue falls short. Instead, it insisted that the foreign company bidding on a tender commit to financing the total cost of construction. This model was designed to avoid incurring any public debt.

Beginning in 1984, Ankara had asked that the foreign bidder pay for the cost of construction and recoup expenses from guaranteed electricity sales fixed at artificially low rates for 15 years. After recouping expenses, the foreign firm was then expected to transfer the reactor to a Turkish firm, in exchange for a percentage of future profits. While some foreign suppliers initially agreed to this arrangement, Ankara's insistence on 100 percent foreign financing prevented the conclusion of any deal.

In the mid-1990s, Ankara replaced its build-operate-transfer financing scheme -- which hadn't led to any significant investments in the electricity sector -- with a new arrangement dubbed build-operate-own (BOO). The BOO model still demands that the foreign bidder finance the cost of construction and recoup costs from guaranteed electricity sales, but Turkey dropped its demand that the firm transfer the reactor to Turkish owners. Ankara still wouldn't give treasury guarantees, though, and so continued to struggle to find nuclear suppliers among major Western and Asian companies.

Eventually, though, Turkey attracted the Russians, and in May 2010 concluded a $20 billion BOO arrangement with a consortium led by Rosatom, the state-owned nuclear company. Rosatom agreed to go ahead with construction without receiving financial guarantees from Ankara.

Turkey's governing Justice and Development Party (AKP) has gone to great rhetorical lengths to convince voters that the nation must develop nuclear energy, or otherwise face a future marked by power outages and energy dependence. The Russian agreement, however, exposed the AKP to a political backlash. Russia is Turkey's primary supplier of natural gas, and many Turks have wondered whether the AKP was simply shifting from natural gas to enriched uranium -- while remaining as dependent as ever, if not even more so, on Russia.

Perhaps unsurprisingly, Ankara avoided granting Russia a second deal when it issued its latest nuclear tender. However, it was difficult for Turkey to entice the most reliable nuclear suppliers without altering its financing demands. Faced with a choice between revising its policy and partnering with an unproven supplier like China for older reactor designs, Turkey's leadership opted for the former path.

That was enough to bring the Japanese to the table in the $22 billion deal struck this month. Under the agreement, Japan's Mitsubishi and Itochu, together with France's GDF Suez, will build and operate four Atmea1 1100-megawatt pressurized water reactors at Sinop. This time, Ankara agreed to back the project with a substantial minority stake. The initial terms of the agreement call for EUAS, Turkey's state-owned electricity utility, to take a 49 percent stake, although Turkey has expressed interest in selling up to half of that in a public offering. In return, Japan and Turkey agreed to sell the power produced in the reactors for $11.80 to the state-owned Turkish Electricity Trading and Contracting Company (TETAS) -- a price even lower than the Russian plant at Akkuyu will charge.

**Speed over safety?**

Neither the Japanese-French nor the Russian reactors pose a significant proliferation risk. For one thing, Ankara has agreed to abide by the tough inspections called for under the International Atomic Energy Agency's (IAEA) Additional Protocol. It has also concluded a fuel guarantee and take-back arrangement with Rosatom, under which the company takes back spent fuel, a fissile material that could theoretically be diverted for non-peaceful uses. Turkey will likely negotiate a similar arrangement with a member of the Japanese-French consortium. Moreover, the fact that both plants will be foreign-owned and foreign-operated decreases the likelihood that any Turkish official will seek to divert material or technology for a weapons program.

However, the AKP's rush to develop nuclear power as quickly and cheaply as possible could pose a number of safety and security risks.

The BOO model has never been used for a nuclear power reactor. With the plants being operated by foreign companies, Turkish officials will have to find a way to ensure that suppliers do not cut corners to keep costs low.

Turkish Prime Minister Recep Tayyip Erdogan is eager to have at least one reactor each from the Japanese-French and Russian projects online before the 2023 Turkish centennial. The IAEA, however, recommends that new nuclear states take 10 to 15 years to bring their first reactor online. Erdogan's 10-year vision may be unrealistic or unsafe.

With both projects likely to suffer delays, it is important that politics not trump safety, but there's a serious risk that they could. Ever since the disaster in 2011 at the Fukushima Daiichi Nuclear Power Station, the IAEA has recommended that a country's regulatory authority be separate from the body that promotes nuclear energy, in order to prevent a conflict of interest between commercial and safety considerations. But the Turkish Atomic Energy Authority is tasked with promoting nuclear energy along with inspecting nuclear facilities and issuing site licenses. Moreover, the prime minister's office has substantial sway over the authority's decision-making, selecting its leadership and allocating funds. This raises uncomfortable questions about political interference in the project, for example by pushing for speed over safety.

While the planned reactors do not pose a significant proliferation risk, the combination of weak export controls and an increased presence of nuclear materials and related technologies could lead to dangers. Turkish companies were among the many international suppliers to A.Q. Kahn's black-market nuclear smuggling ring.  Moreover, according to recent indictments in Turkey, Europe, and the United States,  nuclear materials have been transshipped via Turkey to Iran. Iranian nationals have established front companies in Turkey to trans-ship technologies critical to Iranian nuclear and ballistic missile programs. Ankara realizes its vulnerabilities, but has yet to pass legislation first proposed in 2008 that would close loopholes and harmonize Turkey's export control laws with those in the European Union.

Turkey has pledged to work closely with the IAEA to ensure safe construction and strict quality controls. Amid its decades-old quest for nuclear power, though, it has failed to develop the necessary laws and regulatory framework with the same eagerness. Such oversight is essential for safety and security.

Ankara should know that there are no painless shortcuts for developing nuclear energy, and make sure that it is building the safest and most reliable nuclear-energy program possible.

# If the Boston Marathon attack had involved dirty bombs

Source: http://www.thebulletin.org/web-edition/features/if-the-boston-marathon-attack-had-involved-dirty-bombs?utm\_source=iContact&utm\_medium=email&utm\_campaign=Bulletin%20of%20the%20 Atomic%20Scientists%20-%20Newsletter&utm\_content=

Last month's Boston Marathon bombing was horrific enough without getting into ways in which it could have been worse. But in fact there is one avenue of speculation worth exploring, because doing so could help keep cities safe in the future: What if the explosive devices allegedly used by the Tsarnaev brothers had contained radioactive material? What would be the effect of such a so-called dirty bomb?

To date, attempts or threats to use radioactive materials as weapons have surfaced only a few times. (Chechen separatists have been prominent among the perpetrators.) However, it's common for radioactive materials to go missing: the International Atomic Energy Agency's Incident Trafficking Database receives a new report of radioactive material that is out of regulatory control about every other day. Many experts believe it's only a matter of time before a dirty bomb or another type of radioactive dispersal device is used, with some expressing surprise that it hasn't happened already.

Although the Boston attackers did not use dirty bombs, with a little effort and planning they likely could have stolen radioactive materials from commercial or medical users, or from university research facilities. To be sure, the radioactive material they could have obtained likely would not have been the most dangerous kind. Plus, it's not clear how effective their pressure cooker bombs would have been at dispersing it. Many experts have noted that the most frequently-stolen types of radioactive materials -- such as the type found in the moisture-density gauges used in construction -- are unlikely to cause deaths by exposure to radiation.

That doesn't mean, though, that the impact of a dirty bomb attack won't be significant. The initial physical injuries due to the Boston explosives might have been essentially the same if dirty bombs were used, but the presence of radiation would have affected the response at every level.

Within seconds of the Boston blasts, the police and others were working to render aid to the victims. Some of the first responders probably carried simple "radiation pagers," devices that can detect the presence of some kinds of radiation. If the pagers had gone off, it could have hampered immediate assistance to victims. Police and firefighters would have been concerned not only with their own safety, but with that of others rushing to assist.

Had the Boston bombs been dirty bombs, a full-blown radiation response would have been required. The response planners would have had to deal with the fact that people not showing visible physical injuries could have ingested or inhaled radioactive material and been contaminated, or could have been exposed without being contaminated. Could Boston have established timely triage and contamination zones to prevent the movement of contaminated people and material out of the area -- or would the situation have resembled the chaos in the 2004 movie Dirty War, a fictional account of a dirty bomb attack in London?

**Health hazards**

If the Boston marathon had been attacked with dirty bombs, hospitals would have received contaminated victims and patients with radioactive material embedded in them. Protocols for dealing with these problems could have led to delays and further loss of life.

Even if no victims were killed by radiation, there would be long-term medical repercussions. Public health officials would have to determine the radiation doses both to the people who were contaminated and to those who were merely exposed. The history of the few large-scale radiation exposure accidents, such as the 1987 incident involving a medical radiation source in Goiania, Brazil PDF, indicates that the public's fear of all things involving radioactivity might greatly expand the medical response required. Medical personnel would need to deal with people who have not been exposed to radiation, but fear they have been.

Most of the radiation exposure from a dirty bomb would likely have no immediately observable effects, but could lead to stochastic effects, primarily radiation-induced cancers, in numbers that would be difficult to distinguish from normal cancer rates. However, the potential victims would probably demand to be tracked with programs that could last for many decades.

The victims of the Boston bombings and their families may suffer lifelong mental impacts in addition to injuries from the blasts. While the physical injuries from dirty bombs would be about the same, they could lead to a wider range of physical and mental effects. There would be a group of potential long-term victims left to wonder about their status for decades, uncertain as to whether the exposure they received would cause medical problems.

**Legal reaction**

The forensic response would also have to have been handled differently if radioactive material had been used. With the crime scene contaminated, it would have been more difficult to acquire and process all the photos and videos that turned out to be instrumental in tracking down the Tsarnaev brothers. Items that technicians were able to examine relatively quickly, such as parts of pressure cookers and circuit boards, might not have been available in the same time frame. Normal police forensic labs are not generally equipped to analyze radioactively contaminated items, and experts in nuclear forensics are few and far between. The work that the public observed done so quickly and efficiently in Boston would have required significant outside assistance. The effects could have delayed identification of the bombers, and perhaps allowed them to carry out more attacks.

Had radioactive materials been used, public officials would also have had to consider what level of cleanup Boston required. Contaminated material would have to have been removed and treated as radioactive waste, at great cost. The Environmental Protection Agency has standard decontamination guidelines, but the public might have demanded even more cautious ones.

Finally, any dirty bomb incident could have major political and legal ramifications. Modern tragedies of all types have generated calls for laws to ensure that whatever happened cannot occur again. Some of these new regulations end up well thought out, while others that initially appear helpful are counter-productive. Some, however logical, cannot survive the political process. The reaction to a dirty bomb would probably be just as messy.

It's not pleasant to think through worst-case scenarios, but in this case it's essential. The media, citizens, and all levels of government should undertake a thorough exploration of how to respond to a dirty bomb, so that they are prepared when one is actually used.

## PPPL and Princeton scientists developing novel system for verifying nuclear warheads

###### By John Greenwal ( Princeton Plasma Physics Laboratory)

Source:http://www.princeton.edu/main/news/archive/S36/67/35Q61/?goback=.gde\_3904448\_member\_241230168

Scientists at Princeton University and the U.S. Department of Energy's (DOE) Princeton Plasma Physics Laboratory (PPPL) are developing a unique process to verify that nuclear weapons to be dismantled or removed from deployment contain true warheads. The system would do so without measuring classified information that could lead to nuclear proliferation if the data were to be leaked.

The novel verification process draws upon principles used in cryptography, the science of disguising information. Researchers said the project could help support nuclear arms talks and ensure that weapons of mass destruction are truly removed from circulation.

"The goal is to prove with as high confidence as required that an object is a true nuclear warhead while learning nothing about the materials and design of the warhead itself," said physicist Robert Goldston, a co-principal investigator for the project and professor of astrophysical sciences at Princeton. He is a fusion researcher and former director of PPPL.

From left, lead engineer Charles Gentile and physicists Alexander Glaser and Robert Goldston examine neutron detectors that have collected preliminary data. *(Photo by Elle Starkman)*

Goldston and Princeton physicist Alexander Glaser, working with PPPL engineer Charles Gentile, have begun building an experimental system at PPPL to probe a DOE-approved, unclassified, and steel-encased test object containing non-nuclear materials. The project would mimic the procedure for inspecting warheads. They hope to complete the first full phase of experiments by the end of the year.

Glaser and Goldston both are associated with Princeton's Program in Science and Global Security.

The idea behind the warhead verification system is surprisingly simple. It calls for comparing a nuclear warhead that is presented for inspection with a presumed identical one — sometimes called a "golden warhead" — that is known to be real and armed with fissile, or explosive, nuclear material.

"You just need to know that one warhead is good, and if you can verify that one you can verify others," said Glaser, an assistant professor of mechanical and aerospace engineering and international affairs in Princeton's Woodrow Wilson School of Public and International Affairs.

Such a "zero-knowledge protocol" for verifying warheads could create a new tool for global arms control efforts. While the total number of nuclear weapons in the United States and Russian arsenals has shrunk from more than 60,000 reported deployed and nondeployed warheads during the Cold War to some 16,000 reported today, this has been achieved without verification of the actual contents of the warheads. Arms inspectors have instead counted the reduction of nuclear weapon delivery systems, such as submarines and missile silos, without requiring or verifying the dismantlement of the warheads themselves.

"It is certainly true that if a workable zero-knowledge approach proves feasible, it would greatly facilitate nuclear warhead reduction regime verifications," said James Fuller, an independent consultant and former director of Defense Nuclear Nonproliferation Programs at the Pacific Northwest National Laboratory.

The PPPL project aims to show that the zero-knowledge verification process can work.

"We know it is doable in theory, but will a hardware implementation used under real-world conditions be sensitive enough to detect meaningful differences and violations?" said Glaser, who thought up the system with Goldston and computer scientist Boaz Barak, a former Princeton associate professor of computer science and now a senior researcher at Microsoft Research New England.

Similar verification processes are regularly used online to authenticate passwords and other encrypted data, Glaser noted.

The warhead verification system would work like this:

* Arms inspectors beam high-energy neutrons at the presumed nuclear warhead and record how many pass through the warhead to an array of radiation detectors on the other side. Neutrons that fail to reach the detector have been absorbed or scattered by the material inside the warhead.
* The neutrons that do reach the detectors are counted and added to the number that the host nation whose warheads are being inspected had "preloaded" into the detectors. Inspectors would measure the total number of counts in the detectors without knowing how many had been preloaded. This total count could be straightforwardly tallied with nonelectronic neutron counters such as the personal dosimeters used to measure exposure to radiation in nuclear power plants.
* If the total number of counts matched the number that the parties had stipulated in advance, the warhead would be found to be a true one. But if the total differed from the stipulated number, the warhead would stand exposed as a spoof. To prevent cheating by preloading detectors in such a way that a spoof would pass the test, the inspector decides on the spot which preloaded detectors will be used on the "golden warhead" and which on the item offered for inspection.
* An alternative approach would be to make measurements on a large set of putative warheads, including some selected by the inspector from among deployed missiles. Since at least some of the deployed warheads would be real, if all of the warheads are measured to be identical, all are real.

The project is funded by grants of $100,000 from the U.S. State Department and $162,500 from Global Zero, a nonprofit organization dedicated to eliminating all nuclear weapons.

Glaser views this zero-knowledge protocol as an incentive to support and facilitate future nuclear arms talks.

"I think it will be important to have this on the table when people think about an inspection system," Glaser said. "Many will say that it's impossible to verify nuclear warheads without running the risk of leaking classified information and so contributing to nuclear proliferation. It would be a powerful argument to show that in principle, and even in real experiments, you can build a system that never measures any properties of objects but still verifies that they are identical to one another, and can achieve this to whatever level of accuracy is required."

# Questioning Riyadh's Nuclear Rationale – Saudi Arabia's Atomic Ambitions

**By Yoel Guzansky**

Source: http://www.meforum.org/3512/saudi-arabia-pakistan-nuclear-weapon

In the last few years, a marked shift in Saudi thinking on nuclear issues has become evident. Saudi princes have explicitly and publicly stated that a nuclear military option is something the kingdom is obligated to examine if Tehran is not stopped in its march toward nuclear weapons. In March 2011, Prince Turki al-Faisal, former head of Saudi intelligence and ambassador to the United States, called for the Gulf states to acquire "nuclear might" as a counterweight to Iran should efforts fail to persuade it to abandon its military nuclear program,[1] a point he repeated several months later.[2] U.S. diplomat Dennis Ross confirmed that Saudi King Abdullah explicitly warned Washington in April 2009: "If they get nuclear weapons, we will get nuclear weapons."[3] Ross's quote of the Saudi king appears to be the first public confirmation of Riyadh's position. An unconfirmed report alleges that Abdullah made a similar statement to Russian president Vladimir Putin in their February 2007 summit.[4]

Despite its wealth and status, the kingdom operates out of a deep sense of inferiority and vulnerability: Some of its neighbors, notably Iraq and Iran, are powerful and historically hostile; its long borders are porous; it has a large Shiite population of questionable loyalty in its sensitive oil-producing regions, and its strategic installations are vulnerable.[5] In Riyadh's view, nuclear capabilities in Iranian hands would allow Tehran to dictate the Gulf agenda—including its oil markets—as well as incite the Shiites in Saudi Arabia's eastern province, undermining the kingdom's status in the Muslim world as well as the royal family's grip on power.[6]

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| http://www.meforum.org/pics/large/281.jpg  The Saudis are increasingly likely to turn to Pakistan, a fellow Sunni nation with nuclear expertise, for aid in confronting Iranian ambitions. Saudi King Abdullah (left) welcomes Pakistani president Zardari to Riyadh, July 2011. |

The public statements reflecting Saudi intent to acquire nuclear weapons may be intended primarily to convince Tehran that obtaining the bomb will have unintended consequences. They may even be intended to pressure Washington to deal more forcibly with Tehran in order to prevent it from becoming a nuclear state. Nonetheless, these statements are not something to be taken lightly. Given Riyadh's historical involvement (albeit not all of it proven) with nuclear weapons programs and its military inferiority to Tehran, it is liable to strive for a nuclear deterrent of its own. Saudi Arabia may indeed become the first nuclear state to acquire rather than develop nuclear capabilities.

### Immediate Solutions

Riyadh would view nuclear weapons as a counterweight to Tehran. The kingdom, which has traditionally achieved its goals through behind-the-scenes maneuvering backed up by enormous wealth, would probably not change this paradigm if it acquired a nuclear weapon.[7] The lack of transparency typical of Saudi decision-making does not afford knowledge of what, if any, decisions have been made on nuclear matters. Decisions on sensitive issues are made in very secretive settings usually involving the king and the brothers closest to him and are affected by a sluggish process that tends to seek consensus through consultation within the family, requiring the placation of various factions within it and within the broader circles of regime supporters.[8]

Due to its extremely limited research and development capabilities and know-how, Riyadh's possible nuclear pursuit is likely to be done with external help and acquisition of an off-the-shelf deterrent. It has nowhere near the level of indigenous technical capacity needed to produce, maintain, or deploy nuclear weapons. No long-term strategy for developing its nuclear sector has been publicly issued, nor does Riyadh possess the necessary institutional support (across regulatory, technical, and legal fields) to effectively retain nuclear deployments. Therefore, it might partner with China or Pakistan or both, which have the necessary technological and human infrastructures.

Saudi Arabia's track record merits some well-placed concern over the issue of nuclear weapons. In the late 1980s, China secretly supplied Riyadh with thirty-six CSS-2 intermediate-range ballistic missiles (IRBMs). A recently inked civilian nuclear cooperation deal with Beijing, supplier of the CSS-2s and reported supplier of newer and still nuclear-capable DF-5 ICBMs, may also be troubling.[9] Furthermore, the recent inauguration of a new command and control center belonging to the Strategic Missile Force near Riyadh raises a question: Why would Saudi Arabia invest billions in updating its strategic command and control facilities if it still possesses only outdated Chinese missiles?

The visit by the late Saudi defense minister, Crown Prince Sultan, to a uranium enrichment facility and a Pakistani missile production plant near Islamabad in 1999 (hosted by A.Q. Khan, accused of passing on nuclear secrets) raise concerns about Riyadh's future relations with Islamabad in this matter. On at least one occasion, Khan visited Riyadh,[10] and reports have surfaced about Pakistani scientists coming to Saudi Arabia under the guise of Hajj pilgrims.[11]

These concerns and connections are not merely speculative. Islamabad's willingness to provide security support for Riyadh, should the Saudis feel that there is a real danger to the kingdom's stability, was put to the test in the spring of 2011. The Saudi royals' fear that the Shiite uprising in Bahrain would spread to Shiite centers in northeast Saudi Arabia (where most of the kingdom's oil reserves are located) prompted Riyadh to ask Islamabad to place an expeditionary force on alert ready to be deployed on Saudi soil should the security situation deteriorate.[12] Pakistan responded positively to the Saudi request.[13]

Riyadh views Islamabad as its strategic hinterland. The Saudis are behind the financing of many arms deals, and in exchange, receive training of their aerial and naval personnel by the Pakistanis.[14] During a visit by Pakistani president Zardari to Riyadh in July 2011 (a visit that reportedly enhanced the strategic relations between the countries), King Abdullah thanked him for his support in Bahrain, where Pakistani mercenaries helped put down the Shiite uprising, and in maintaining regional stability. A month later, Pakistani prime minister Yousuf Raza Gilani also visited the kingdom, asking for Saudi help with oil supplies in light of Islamabad's economic situation and Washington's threats to cut off support; it is unclear what Pakistan promised in exchange for the aid.[15] Riyadh maintains a very close relationship with the heads of Islamabad's military and intelligence services. This is significant in the nuclear context because from the start, the Pakistani nuclear program was under the control of the military establishment without any real involvement on the part of the political leadership.[16]

The two nations, both with Sunni majorities, border Iran on two sides and are interested in curbing Tehran's power and influence.[17] Pakistan, lacking the monetary resources, has the requisite knowledge and skilled manpower for developing nuclear arms whereas Saudi Arabia is wealthy but lacks the relevant infrastructure and trained personnel. One cannot rule out the possibility that Riyadh may seek to balance Tehran's power by increasing cooperation in the nuclear field with its long-standing friend, despite the political risks of jeopardizing well-established defense relations with Washington. In October 2010, the head of the strategic planning unit of Pakistan's armed forces, who is responsible for the production, security, and storage of the nation's nuclear weapons, said that Islamabad had the right to provide its expertise in the nuclear field to other nations.[18] In the past, both Islamabad and Riyadh denied such a scenario.

Should Saudi Arabia find itself in a sensitive security situation, it may seek to capitalize on its investment in the Pakistani nuclear program and pressure Islamabad for assistance. It is unclear whether there is, in fact, a binding nuclear agreement between the states though the assessment is that both states have at least discussed the option. If such an agreement exists, the two have presumably trained for operational cooperation in this field.[19] Gary Samore, President Obama's advisor on arms control, has said that the possibility of Pakistani nuclear forces being placed in Saudi Arabia cannot be ruled out.[20]

Although there has never been a precedent of one state selling or transferring actual nuclear warheads to another, there is the precedent of exchange of nuclear technology between Pakistan and North Korea[21] as well as proliferation of forbidden nuclear equipment and know-how to countries including Iran and Libya and possibly Syria or Saudi Arabia.[22] As Tehran progresses, Riyadh is likely to exert more pressure on Islamabad to fulfill its presumed commitments. It is by no means certain that Pakistan will yield to Saudi pressure and inducements, but it is impossible to rule out the deployment of Pakistani fighter jets or surface-to-surface missiles with nuclear warheads, controlled by Pakistan, on Saudi soil.

### Long-term Solutions

At the same time, the kingdom is accelerating its independent nuclear development—one of the largest development projects in its history—as another option in response to Iran. Saudi Arabia has in recent years started to prepare openly for the development of a civilian nuclear program and is broadening efforts to construct a knowledge base in the field, possibly as another way of establishing nuclear military capabilities over the long term.[23] It has initiated a string of projects and signed cooperation agreements with France, Russia, the United States, South Korea, and China.[24] In 2006, Riyadh called for the Gulf Cooperation Council (a regional bloc that includes Kuwait, the United Arab Emirates, Bahrain, Qatar, and Oman) to develop a shared program to use nuclear technologies for peaceful purposes in accordance with international treaties.[25] The Saudi foreign minister, Prince Saud al-Faisal, sought to assuage concerns about possible intentions to develop nuclear weapons stating, "It is no secret and we're doing everything out in the open. Our goal is to pursue technology for peaceful uses—no more and no less."[26] Yet notwithstanding similar declarations over the years, the kingdom has signaled that it would not surrender the capability to enrich uranium on its soil, which continues to raise doubts about its intentions.[27]

In April 2010, King Abdullah called for the establishment of a national body for nuclear research and development. In addition, he stated that Riyadh would invest more than $100 billion over two decades to establish no fewer than sixteen nuclear reactors with the first reactor set to be connected to the power grid by 2020.[28] While the civilian nuclear program seems designed to be a symbolic response to Tehran's nuclear project in the short term, this does not preclude the possibility of its serving as a cover or preliminary stage for a military nuclear project in the future. In June 2005, Riyadh signed the Small Quantities Protocol with the International Atomic Energy Agency (IAEA), but this protocol exempts it from intrusive inspections and makes it difficult for the IAEA to ensure there is no forbidden development underway. The concern that loopholes in the protocol could allow nations to develop military nuclear capabilities has moved the IAEA to attempt to change it.[29] Riyadh's response was to hurry to sign the present text, despite Washington's opposition.

### Still Relying on America?

A signal from Riyadh that it intends to pursue the nuclear route may indeed be an effective way to pressure Washington to demonstrate its commitment to defend the kingdom more convincingly. Saudi doubts about their U.S. allies preceded the Obama administration's conduct during the recent Arab upheavals but have been intensified by them. In the last two years, the kingdom has missed few opportunities to express its displeasure with Washington's policy toward Tehran.[30] Although Secretary of State Hillary Clinton promised to extend the U.S. "defense umbrella" to the Gulf states should Tehran acquire military nuclear capabilities,[31] this type of declaration allays few fears as it is liable to be seen as a grudging acceptance of a nuclear-armed Iran. While Washington would not have to deploy nuclear forces on Arabian soil to deter aggression, such a move would make the message of deterrence more credible and calm Saudi nerves. However, any U.S.-Saudi security arrangement would likely be covert so as not to embarrass the kingdom vis-à-vis elements opposed to hosting "infidels" on "sacred" lands. Another possibility would be to deploy nuclear forces offshore. A hint that such an option might be in the making came in March 2010 when the U.S. navy fired a missile capable of carrying a nuclear warhead from a submarine near the Saudi coast.[32]

Continued Iranian progress toward a nuclear weapon, Iraq's increasing alignment with Tehran, and an expedited U.S. exit from Afghanistan are all changing the Saudi strategic landscape. The Obama administration's "lead from behind" approach in Libya and its hesitation to get involved in the Syrian civil war all contribute to a reassessment of U.S. commitments. With the U.S. "pivot to Asia"—taking the form of a series of military, economic, commercial, and diplomatic initiatives aimed at contending with the rising power of China—and a changing global energy map due to expansion of oil and natural gas production in the United States, Riyadh and others are beginning to prepare for a post-U.S. Middle East.

According to recent reports, Washington is considering expanding its nuclear cooperation with Riyadh on the basis of a 2008 memorandum of understanding: In exchange for foregoing the operation of nuclear fuel cycles on its soil, Saudi Arabia was to receive nuclear assistance.[33] Such a move, should it come to pass, may be meant to persuade Riyadh to abandon its strategic goals, prevent other players from gaining a foothold in the attractive Saudi market, and challenge Tehran's nuclear policy. The United States is still Saudi Arabia's most effective security support, but if Washington distances itself from regional matters, the gradual entrance of new players into the Gulf is inevitable.

The question of Saudi acquisition of a nuclear deterrent is more relevant than ever when both enemies and friends of the United States are looking at a possible regional drawdown on Washington's part as well as a lack of support for the pro-Western regimes that remain in place. If the U.S. government provides Riyadh with formal security guarantees, it would be natural for it to demand that the kingdom forego its strategic goals. But Riyadh's inclusion under a U.S. defense umbrella is not a given and depends both on the quality of relations between the two countries and other Saudi considerations. Riyadh remains skeptical over Washington's willingness to come to its aid and may thus seek to purchase a nuclear deterrent, which would provide it with more freedom vis-à-vis its stronger ally. Under present circumstances, it is not unreasonable for Riyadh to rely on other states for its defense in addition to Washington for the simple reason that it has done so in the past. Likewise, it is more than likely that the Saudis will not act transparently because they have acted in secret previously.

### Conclusion

After Iran, Saudi Arabia is the number one candidate for further nuclear proliferation in the Middle East. Open source evidence remains circumstantial, but perhaps more than any other regional player, Riyadh has the requisite ideological and strategic motives as well as the financial wherewithal to act on the option.

The kingdom may conclude that its security constraints as well as the attendant prestige and influence generated by having a bomb outweigh the political and economic costs it will pay. The difficulty in stopping Tehran's dogged quest for a nuclear capability coupled with Riyadh's doubts about the reliability of Washington is liable to encourage Riyadh to shorten timetables for developing an independent nuclear infrastructure, as well as to opt to purchase a turnkey nuclear system, an off-the-shelf product, or to enter into a security compact of one sort with another power. Sunni-majority Pakistan has emerged as the natural candidate for such an arrangement.

Heavy U.S. pressure is likely to be brought to bear on the Saudis not to acquire nuclear capabilities. Indeed, it seems that, at present, the price Riyadh is likely to pay should it acquire military nuclear capabilities might outweigh the advantages of such a move. But strategic interest, motivated by considerations of survival, could have the upper hand. Should it seem that the kingdom's vital security interests are threatened, it may prefer to take a series of steps, including obtaining a nonconventional arsenal, to reduce risks and ensure the continuity of the House of Saud.

**►References: available at source link**

***Yoel Guzansky*** *is a fellow at the Institute for National Security Studies, Tel Aviv University. His main research area is Gulf security. He has also served as Iran coordinator at Israel's National Security Council. His recent publications include The Gulf States in a Changing Strategic Environment (2012), One Year of the Arab Spring: Global and Regional Implications, and The Gulf States: Between Iran and the West (co-editor, 2012).*

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| INDIA – International Strategic & Security Studies Programme  Source: http://isssp.in/  http://isssp.in/wp-content/uploads/2013/05/nias-new-header.pngThe International Strategic & Security Studies Programme, was started at the National Institute of Advanced Studies (NIAS), Bangalore in 1996 with the broad objective of conducting academic and policy research related to national and international security issues. The emphasis of research is towards integrating complex elements of science and technology with policy, organizational and institutional arrangements. Rapidly changing geo-political and technology adaptation scenarios affect the national and international strategic conditions and the research carried out in the Programme reflects this. Current and emerging scenarios relating to nuclear, missiles and space weapons are reflective of such an impact and have formed the core area of research. | | |
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# Chernobyl haunts Northwest Greece

# Source: http://sportsioannina.gr/epikairothta/33757-2013-06-02-13-25-33.html

# (*Translated from Greek*)

# Amounts of radioactive cesium 137 has been detected by scientists in areas of Northwestern Greece, demonstrating that, 26 years after the Chernobyl still haunts large expanses of land in the country ...

# The survey of local experts from the Universities of Athens and Ioannina presented at the Symposium of Nuclear Physics organized by Department of Physics, University of Athens.

# http://www.maps-of-greece.com/maps-of-greece/maps/North%20Greece.gifWhat is surprising is that the specific cesium 137, which is a manmade element - a remnant nuclear explosion – remained in the same areas of Greece which fell 26 years ago. Cesium 137 is eminently a radioactive element but currently no one in Greece can say for sure what effect it had or still has on humans and the ecosystem. Detected in smaller amounts than in the early 1990s, neither snow nor rain has been enough to wash it away. The bulk of the cesium 137 - which emits gamma radiation - is in the first 10 cm of soil.

# "The greatest concentrations of cesium 137 spotted in the northern part of the prefecture of Trikala and the southern part of the prefecture of Grevena," says Ass Prof Thanasis Gkontelitsas, Department of Mineral Chemistry at the University of Athens, who participated in the survey. "We visited the areas in which, as shown by measurements had been made in the 1990 by Prof Simos Simopoulos of the Polytechnic School had settle large amounts of cesium-137, coming from the explosion at the Chernobyl nuclear reactor."

# Samples taken by experts showed that the residues of that destruction have been eliminated from the territories of the country.

# Mr. Gkontelitsas with Ass Prof Theo Mertzimekis, Department of Physics at the University, and graduate student John Ioannidis, took soil samples to a depth of 30 cm of non-cultivated land in upland areas of the two counties. They drained samples and sieved them to attain soil particles of less than 2 mm. Then transferred the samples to the Department of Physics, University of Ioannina where using gamma ray spectroscopy of high resolution, and under the supervision of Prof Constantinos Ioannides measured how burdened were samples from the radioactivity of fallout from Chernobyl. They found that the content of soil cesium-137 ranged mostly from 20 Bq per kg of soil to maximum 97 becquerels, which is close to "alarming levels".

# Cesium-137 is not abundant in nature. It is mainly deposited after explosions in nuclear reactors, nuclear tests or explosion of nuclear bombs. Researchers concluded: "The fact that cesium has been detected even at a depth of only five centimeters means that all these years it remained as if it fell for the first time."

## Health impact of Chernobyl accident overestimated

Source: http://www.homelandsecuritynewswire.com/dr20130602-health-impact-of-chernobyl-accident-overestimated-study

The impact of the Chernobyl nuclear accident has been seriously overestimated, while unfounded statements presented as scientific facts have been used to strangle the nuclear industry, according to Russian researchers.

The impact of the Chernobyl nuclear accident has been seriously overestimated, while unfounded statements presented as scientific facts have been used to strangle the nuclear industry, according to Russian researchers. Writing in the International Journal of Low Radiation, Sergei Jargin of the Peoples’ Friendship University of Russia in Moscow, suggests that the health effects of food contamination in particular have been distorted in anti-industry propaganda.

An Inderscience Publishers release reports that Jargin has analyzed the scientific research literature and after the twenty-fifth anniversary of the Chernobyl accident, and has investigated the motives and mechanisms of the overestimation of medical risks in an attempt to finally clarify the issues surrounding the Chernobyl legacy. He points out that there are examples in the literature that he considers inaccurate. Moreover, many of these publications cite what Jargin refers to as “numerous references to mass media, websites of unclear affiliation and commercial editions, used to corroborate scientific views,” as opposed to properly referenced, peer-reviewed scientific publications.

“Today, there are no alternatives to nuclear power: fossil fuels will become increasingly expensive, contributing to excessive population growth in fuel-producing countries and poverty elsewhere,” the Jargin says. He adds that, “Natural sources of power generation like wind, solar, geothermal, hydroelectric power and electricity from combustible renewables and waste will make a contribution, but their share in the global energy balance is too small.” It is likely that at some point in the future nuclear fusion reactors will become a viable replacement for the fission reactors we have today, but for the time being, “nuclear energy should be managed and supervised by a powerful international executive,” concludes Jargin. Robust due diligence with regard to sociopolitical, geographic, geologic, and other pre-conditions would also help prevent future accidents.

*— Read more in Sergei V. Jargin, “Food contamination after the Chernobyl accident: dose assessments and health effects,”* International Journal of Low Radiation *9, no.1 (2013): 23-29*

## Laser-driven neutrons to detect nuclear smuggling

Source: http://www.homelandsecuritynewswire.com/dr20130605-laserdriven-neutrons-to-detect-nuclear-smuggling



Los Alamos technician adjusting the TRIDENT laser system // Source: http://nnsa.energy.gov

Los Alamos National Laboratory researchers have successfully demonstrated for the first time that laser-generated neutrons can be enlisted as a useful tool in the war on terror.

The international research team in February used the short-pulse laser at Los Alamos’s TRIDENT facility to generate a neutron beam with novel characteristics that interrogated a closed container to confirm the presence and quantity of nuclear material inside. A Los Alamos Lab release reports that the successful experiment paves the way for creation of a table-top-sized or truck-mounted neutron generator that could be installed at strategic locations worldwide to thwart smugglers trafficking in nuclear materials.

“We have demonstrated for the first time a novel approach for generating a record number of neutrons driven by a laser directed into a beam over a very small area that could provide proof positive of a large variety of nuclear items,” said Los Alamos physicist Andrea Favalli, an Italian researcher who led the February experiment.

For the experiment, researchers at Los Alamos’s TRIDENT facility focused an extremely short and intense laser pulse onto an ultra-thin foil of deuterated plastic — a material in which hydrogen atoms within the foil were replaced with deuterium isotopes. To put the extraordinary experimental parameters in perspective, the power of the TRIDENT pulse is fifty times greater than the entire production of worldwide electrical power packed into a burst of energy lasting only one-half of one-thousandth of a billionth of a second (0.5 picoseconds). The TRIDENT beam is focused at the target into a spot twelve times smaller than a human hair. The thickness of the laser-target foil (0.3 microns) is about 300 times thinner than a human hair.

When this tremendous laser burst hits the foil target, it transfers much of its energy into the deuterium nuclei — the hydrogen isotope with one proton and one neutron — accelerating those particles into a beam traveling at about one-tenth of the speed of light into a second metal target located five millimeters beyond the foil. When the fast-moving deuterons slam into the secondary target, they create a blizzard of very fast moving neutrons (up to forty billion of them, moving at a fraction of the speed of light) in a directed bunch lasting a billionth of a second, in a cone with an angle of about thirty degrees.

In fact, the TRIDENT laser is so good at producing neutrons that it has shattered the previous world record number of neutrons in a laser-generated beam, and drove those neutrons to an energy of more than 150 million electron volts (150 MeV), or more than ten times the energy of neutrons from D-T fusion as produced in devices such as the National Ignition Facility at Lawrence Livermore National Laboratory.

The release notes that in the current experiments, the research team demonstrated that these laser-produced neutrons can be used to search for hidden nuclear material. Neutrons are a good choice as a probe because they can penetrate most materials very easily. If the neutrons encounter some nuclear material (like uranium or plutonium) they cause fission and more neutrons are released. Some of these released neutrons are produced over a period of seconds, which allows them to be measured after the initial neutron burst is finished. These “delayed neutrons” are a good measure of the presence of nuclear material because very few other materials produce them.

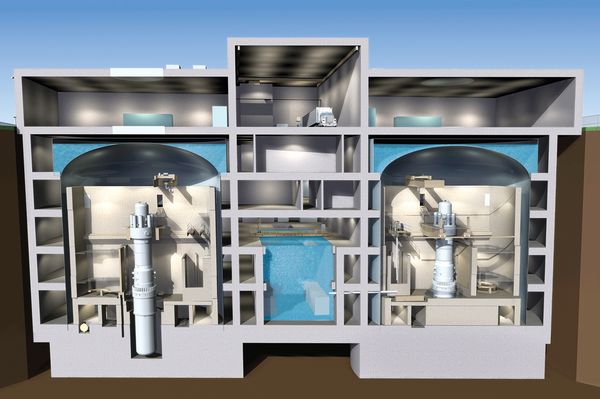
The scientists interrogated a closed container with nuclear material inside and an empty closed container and then compared the results. They found that the laser-driven-neutron-interrogation method not only confirmed the presence of nuclear material, but it told them the quantity as well.

“This is something that has never been demonstrated before,” Favalli said. “Up until this experiment, nuclear material detection with a single laser-generated neutron pulse was merely an idea. Our team invented the concept, fabricated all the materials necessary for the experiment, and confirmed our results within three weeks from start to finish. This is a little bit like the original days at Los Alamos National Laboratory. It is very exciting!”

Detecting and interdicting clandestine nuclear material using active interrogation has been somewhat impractical up until now because doing so would require a giant, stationary facility or long measurement times with less powerful neutron generators. The TRIDENT experiment shows promise for the development of a small, portable neutron interrogator that could be used at border crossings or elsewhere. Neutron interrogation can also be used in other applications such as materials science or the biological sciences, and the use of lasers could make the technique practical in other laboratories and universities.

# First "Small Modular" Nuclear Reactors Planned for Tennessee

Source: http://news.nationalgeographic.com/news/energy/2013/06/130605-small-modular-nuclear-reactors-tennessee/

Small modular nuclear reactors, like the one seen illustrated here by the firm Babcock and Wilcox, bring together components that are usually housed separately at full-scale plants. That design feature can boost safety or increase vulnerability, depending on whom you ask (Illustration courtesy Babcock & Wilcox Nuclear Energy).

**Near the banks of the Clinch River in eastern Tennessee, a team of engineers will begin a dig this month that they hope will lead to a new energy future.**

**They'll be drilling core samples, documenting geologic, hydrologic, and seismic conditions—the initial step in plans to site the world's first commercial small modular nuclear reactors (SMRs) here.**

Once before, there was an effort to hatch a nuclear power breakthrough along the Clinch River, which happens to meander through the U.S. government's largest science and technology campus, Oak Ridge, on its path from the Appalachian Mountains to the Tennessee River.

In the 1970s, the U.S. government and private industry partners sought to build the nation's first commercial-scale "fast breeder" reactor here, an effort abandoned amid concerns about costs and safety. Today, nuclear energy's future still hinges on the same two issues, and advocates argue that SMRs provide the best hope of delivering new nuclear plants that are both affordable and protective of people and the environment. And even amid Washington, D.C.'s budget angst, there was bipartisan support for a new five-year $452 million U.S. government program to spur the technology.

The first project to gain backing in the program is here on the Clinch River at the abandoned fast breeder reactor site, where the Tennessee Valley Authority, the largest public utility in the United States, has partnered with engineering firm Babcock & Wilcox to build two prototype SMRs by 2022.

SMRs are "a very promising direction that we need to pursue," said U.S. Energy Secretary Ernest Moniz at his confirmation hearing in April. "I would say it's where the most innovation is going on in nuclear energy."

**The Power of Small**

Nuclear power typically is big power, so the drive to downsize marks a significant departure from business as usual. Four of the ten largest electricity stations in the world are nuclear-powered, and the average size of U.S. nuclear reactors is more than 1,000 megawatts (large enough to power about 800,000 U.S. homes). The smallest U.S. reactor in operation, the Fort Calhoun station in Nebraska, is more than 500 MW.

In the first U.S. government-backed SMR effort, Babcock & Wilcox's nuclear energy subsidiary, B&W mPower, is developing a 180-MW small modular reactor prototype.

Proponents believe a fleet of bite-sized reactors might have a better chance of getting built than the typical behemoth. Although existing nuclear reactors (thanks to their cheap fuel) currently provide electricity at lower cost than coal or natural gas plants, building a brand new big nuclear plant is costly.

Tom Flaherty, a senior energy consultant for the global management firm Booz & Company, pointed out that nuclear energy investments often fail to reach fruition. Proposals for 30 new reactors have been advanced by U.S. energy utilities in recent years; more than half of these have been withdrawn to date.  A big plant carries another big financial risk; what if there's not enough demand for all that power?

"In today's market, the financial risk of unused capacity means nuclear energy is simply not an option unless you are a very large company," said Flaherty.

Bob Rosner, a nuclear energy expert at the University of Chicago, agreed that the price of a new nuclear plant—which can be around $20 billion—is one that only a handful of energy companies can currently afford.

"Is a company going to bet a third of its market capitalization on a risky project?" Rosner asked. "The answer is no, they aren't going to do it." SMRs, however, could be made in factories at the relatively inexpensive cost of $1-2 billion, Rosner said. They could then be shipped via rail to sites around the United States and the world, where they would be ready to "plug and play" upon arrival.

Experts say such reactors also could be removed as a unit, standardizing waste management and recycling of components. SMRs also can be designed with "air cooling," so that they do not require the large withdrawals of water that today's current nuclear (and coal) plants need to condense steam.

Christofer Mowry, president and chief executive officer of B&W mPower, said his company's prototype, currently being tested at a facility in Lynchburg, Virginia, contains all of the components and safety features of a top-of-the-line, full-scale nuclear facility in a module about the size of a Boeing 737 passenger jet.

Mowry views it as an important step in making an essential form of carbon-free energy generation more easily deployable. "There is a convergence or nexus of forces that are really driving the DOE and the world nuclear industry as a whole to focus on this technology," he said. "There is no silver bullet, but any realistic scenario for power generation over the next 50 years will include nuclear in a big way."

The other players in the race to develop SMRs span the globe: the U.S. engineering firm Westinghouse (owned by Japan's Toshiba), South Korea's Kepco, France's Areva, and UK-based AMEC. Flaherty said there are five different reactor prototypes under development in Russia. "What makes this so attractive from an international development perspective is that developing countries are hostage to the fuel sources they have," he said. "This is a technology that you could take in and put anywhere."

But mPower's effort, with U.S. government backing, is in the lead. Under the terms of an agreement  announced in April, the U.S. Department of Energy will provide mPower with $79 million for the project in the first year, and $226 million or more in federal funding could be available, subject to incremental appropriations from Congress.

**Sizing for Safety**

Proponents of SMRs say their compact size will help to shore up safety protection. For example, U.S. regulations now require that nuclear power plants are able to maintain core cooling after a power blackout for four to eight hours. The most advanced big reactors, like those being installed at Southern Company's Vogtle plant now under construction in Georgia, would have the capability to cope with a three-day outage. But SMRs have added safety features that would keep water circulating through a reactor core in the event of power loss, preventing a nuclear meltdown for weeks.

And there are other protections. The two reactors planned at the Clinch River site will be buried underground with a protective slab of concrete on top. This would make them safe from something like an airplane impact, Mowry says.

Others in the industry say SMRs will also be easier to maintain than existing nuclear plants. Full-scale nuclear facilities have many separately housed components—the reactor core, steam generator, pumping systems, and switchyard, to name a few—each of which requires maintenance personnel. In a SMR, all of these components are downsized and housed together.

To prevent the spread of nuclear radiation in the event of a catastrophe, the U.S Nuclear Regulatory Commission (NRC) currently requires a 10-mile emergency evacuation zone around a nuclear plant. Mowry says the passive safety features of the SMR design will make it safe enough to reduce this zone to a half mile and to site future reactors closer to urban areas.

Not everyone agrees with this assessment. Edwin Lyman, senior scientist at the Union of Concerned Scientists Global Security Program, said there is no reason why regulations should be put in place to accommodate SMRs. He said the point of a 10-mile emergency zone is to provide additional security in the event of an unforeseeable catastrophe, like the 2011 earthquake and tsunami-triggered disaster at Japan's Fukushima plant. "The safety zone is a buffer so that in a worst case scenario, say you have a large radiological release like the one at Fukushima, you can protect the public from a disaster," he said.

He points out that at Fukushima and after the 1986 Chernobyl disaster in Ukraine, contamination of food and liquids occurred farther than 100 miles from the accident sites.

"I simply don't believe that you can justify shrinking those boundaries based on nuclear reactor designs that are just on paper," he said.

Contrary to the view of the proponents, Lyman argues that housing vital reactor components close together could make a plant more vulnerable, because a single attack could be more destructive. "If a terrorist gained access to a SMR facility, a single explosive could potentially take out both the primary and backup safety systems," he said.

Even if a SMR ends up being cheaper to build than a full-scale nuclear facility, some have doubts that the electricity it produces will be cheaper.

Lyman says the low price goes against economy of scale and banks on efficiencies in mass production and lenient safety regulations that have not been demonstrated or approved. "I think the best-case scenario is that electricity from SMRs will cost about the same as electricity from contemporary facilities," he said. "This won't be good enough to convince utilities to ramp up nuclear energy spending when there are cheaper alternatives like natural gas."

He said the unproven economics could make it difficult for B&W and the TVA to raise funds for the actual construction of the Clinch River reactors that have an estimated price tag of nearly $2 billion. "The DOE grant only covers design development and licensing costs," he said. "As far as I know, neither TVA nor any other entity has actually committed to build the Clinch River reactors."

New Energy Secretary Moniz admitted that there are many unknowns, but said that the research was important to pursue. "I think the issue, which remains to be seen and can be determined only when we, in fact, do it, is to what extent will the economics of manufacturing lower the costs relative to larger reactors," Moniz said at his confirmation hearing. "There is a great potential payout there, which goes on top of what are typically very attractive safety characteristics, for example, in the design of these reactors." B&W is planning to submit its Clinch River reactor designs to the U.S Nuclear Regulatory Commissionfor approval sometime next year.

Dan Stout, senior manager for SMR Technology at the Tennessee Valley Authority (TVA.) said TVA's long-term hope is to deploy SMRs at the sites of retiring coal plants. But he said if the licensing requirements prove too exhaustive, and the technology isn't cost-competitive for ratepayers, the project will be scratched.

Nevertheless, he said the team's engineers, as well as TVA's energy consumers, are optimistic about the project's future.

"From the surveys we have done with our consumers, the people are very supportive of the project," he says. "Our team believes that a SMR will be safe enough to warrant a smaller evacuation zone and will prove cost-effective."

# thumbs up.jpg.png

# http://alessandroscarabelli.com/wp-content/uploads/Logo-National-Geographic.jpg

# Quiz: What Do You Know About Nuclear Power?

# Source:http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/nuclear-power-quiz/

# Japanese government admits $1 billion from disaster funds spent on unrelated projects

Source: http://japandailypress.com/japanese-government-admits-1-billion-from-disaster-funds-spent-on-unrelated-projects-0329937

Following a survey by the Asahi Shimbun, Japan’s second-largest newspaper, the country’s government revealed on Monday that as much as 1 billion US dollars of the public’s money that was flagged for use in recovery from the March 2011 earthquake and tsunami disaster was used on projects completely unrelated, and in unaffected areas. Everything from the counting of sea turtles on beaches to cheese & wine party promotions received portions of taxpayer funds that were earmarked for those in need in the Tohoku region.

This marks the largest discovery of ineptitude on the government’s part when it comes to misusing disaster recovery money. One previous instance included the admission that funds had been directed to support the controversial, money-losing whaling program. In Asahi‘s investigation, they discovered that in 38 of the prefectures that were outside the disaster-hit northeast region and received recovery funds, 97% of the people who were paid with said money did originally come from the zone in recovery.

In one such example, a town in southwestern Japan’s Kagoshima Prefecture (the opposite end of the country as the natural disaster, just to be clear) used 3 million yen (approx. 30,000 US dollars) on protection and observation of sea turtles. Incredibly, 10 people were hired to count the ocean creatures as they came ashore to lay eggs, and remind others not touch them or get in their way. One of the workers admitted that the money that was spent on the project wasn’t even really used on the turtles, let alone disaster recovery efforts, as the 10 people weren’t even tasked with objectives like relocating the turtle eggs to safer areas.

The government’s Welfare Ministry attempted to defend itself after the Monday admission, saying that the earmarked funds were dispersed around the country in order to support the business and manufacturing industries whose supply lines were disrupted by the quake and tsunami. In addition to taking over 18,000 lives on March 11th, 2011, the disaster completely erased a number of coastal communities, and forced hundreds of thousands of people to leave their hometowns in order to be relocated. That the government has even tried to defend itself comes as a slap in the face to those who are still awaiting assistance, more than two years now after the tragedies.

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