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**OPINION – Ramesh Thakur**

**Is India Still Committed to its No-First-Use Nuclear Policy?**

On 16 August, Defence Minister Rajnath Singh hinted that India might abandon its no-first-use policy: ‘Till today, our nuclear policy is “no first use”. What happens in future depends on the circumstances.’ Singh was speaking on the anniversary of the death of Atal Bihari Vajpayee, who was India’s prime minister when it conducted five tests in May 1998 and declared itself to be a nuclear-weapon-possessing state. Singh had travelled to Pokhran, the site of the 1998 tests, for that purpose.

The defence minister’s comments came only days after India annulled Kashmir’s special status and provoked a flurry of apocalyptic warnings from Pakistan, which rejects no first use, about a nuclear conflagration. Moreover, Singh took over the portfolio in Narendra Modi’s second cabinet only after the May elections, so his comments are best viewed as more of a thought bubble than considered policy.

The same is true of similar off-the-cuff questioning of the NFU policy by the late Manohar Parrikar in November 2016, when he was defence minister. That produced the extremely unusual clarification from his own

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ministry that Parrikar’s opinion was personal and did not reflect official policy.

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At the biennial Carnegie International Nuclear Policy Conference in Washington in March 2017, Vipin Narang of the MIT gave a talk expounding on the likely abandonment of the policy by India. He drew a very long bow using a few very slender strings like Parrikar’s remarks and scattered musings of some former officials in

newspapers and books. I was there, seated in the audience. Familiar with Parrikar’s comments and most of the other commentary that Narang

used to weave his story, I was taken aback at how much credence he gave to the hypothesis.

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My second reaction was to reflect that, drawing on equivalent remarks by people like Robert McNamara, Lee Butler, Henry Kissinger, George Shultz, Sam Nunn and William Perry, I could make a more persuasive case that the US was about to renounce nuclear weapons! Yet the prospect of that actually happening would be close to zero.

At one level, Singh's remarks are banal: of course, what happens in the indeterminate future will depend on the circumstances of the time. But the triple context of his remarks negates the thesis that Singh was messaging Pakistan about an erosion

of India's commitment to no first use. That's why the use of words like 'ominous' to describe Singh's statement—leading Narang and Christopher Clary to conclude that a 'moth-eaten' no-first-use policy 'wasn't much of a commitment at all', and indeed has now become 'a crumbling pillar of India's nuclear doctrine'—is fundamentally fallacious.

Launching a book in February by Rakesh Sood, his special envoy for nuclear non-proliferation and disarmament, former PM Manmohan Singh described India as 'a reluctant nuclear weapon state'. This reluctance finds expression in its no-first-use policy, confirming that for India, the bomb is a political weapon to deter the use of nuclear weapons against it, not a militarily useable offensive weapon to compel or blackmail another country.

Another major foreign policy goal of all Indian governments has been to de-hyphenate India from Pakistan and convince as many foreign governments and analysts as possible to pair India instead with China as a strategic competitor. Even the original justification by Vajpayee to President Bill Clinton in 1998 explained India's breakout as a response to the China threat, including Beijing's critical role as the enabler of Pakistan's nuclearization. Abandoning no first use, which coincidentally draws on the important Indian cultural tradition of courtesy encapsulated in 'After you' ('Pehle aap'—literally, 'You first'), would disconnect India from China and re-hyphenate it with Pakistan, for no military gain or advantage.

China and India are the only two of the nine nuclear-armed states with the stated commitment to no first use and matching force postures. Between them they possess under 3% of global nuclear warheads, but feel confident enough in their small deterrent forces to adopt no-first-use policies. China is committed to the no first use without qualification. India holds that it will not be the first to use nuclear weapons but would respond with punitive retaliation should deterrence fail and it comes under nuclear, biological or chemical attack.

After the 1998 tests, India's most pressing diplomatic challenge was to reconcile its security imperatives with international concerns about nuclear proliferation. It tried to do so with a stress on responsibility and restraint. The rudiments of its strategic posture congealed around an acknowledgment of the nuclear reality vis-à-vis Pakistan; a minimum deterrent against China; unilateral promises of no use of nuclear weapons against non-nuclear states and no first use against nuclear adversaries; a unilateral moratorium on any further testing; and a commitment to work towards nuclear disarmament.

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Most of this was spelt out in the paper 'Evolution of India's nuclear policy', tabled by Vajpayee in parliament in May 1998, reaffirmed in the national security advisory board's draft report on nuclear doctrine in 1999, and formally adopted by the cabinet committee on security, chaired by the PM, in 2003.

The 1999/2003 nuclear doctrine remains in place despite calls for change among some Indian nuclear strategists who argue it's not credible. After the 2014 election of the Modi government, some Indian hawks, driven by the news that Pakistan had developed the short-range nuclear-capable missile Nasr, called for India to review its policy on no first use. The party's election manifesto had promised to study India's nuclear doctrine and realign it with changing geostrategic realities. However, after the election, Modi put an end to speculation when he stated in public that there would be no doctrinal review.

In addition to its profound symbolic value, no first use has significant practical implications. It encourages a shift away from high-risk doctrines with flow-on requirements for nuclear force posture and deployment—for example, de-alerting, de-mating and de-targeting—that would significantly dampen the prospects of accidental and unauthorised use. A global no-first-use convention, which both China and India have called for at different times, could become the centrepiece of a nuclear restraint regime to strengthen the norm of non-use of nuclear weapons, buttress strategic stability and mute crisis instability by decreasing the pressure on decision-makers to 'use or lose' their nuclear arsenal.

Source: <https://www.aspistrategist.org.au/is-india-still-committed-to-its-no-first-use-nuclear-policy/> 11 November 2019.

OPINION – Heiko Timmers

**Australia Must Engage with Nuclear Research or Fall Far Behind**

Much is made of the "next generation" of nuclear reactors in the debate over nuclear power in Australia. They are touted as safer than older reactors, and suitable for helping Australia move away from fossil fuels. But much of the evidence given in September to a federal inquiry shows the economics of nuclear in Australia cannot presently compete with booming renewable electricity generation.

However, international projections predict nuclear power will stick around beyond 2040. It is forecast to reduce the carbon footprint of other nations, in many cases fuelled by our uranium. To choose wisely on nuclear power options in future, we ought to stay engaged. Renewables in combination with hydro storage might fail to fully decarbonise the electricity sector, or much more electricity may be needed in future for desalination, emission-free manufacturing, or hydrogen fuel to deal with an escalating climate crisis. Nuclear power might be advantageous then.

**What Reactors will be Available in Future?** All recent commissions of nuclear power stations, such as the Korean APR-1400 reactors in the United Arab Emirates, or the Chinese Hualong One design, are large Generation III type light water reactors that produce gigawatts of electricity. Discouraged by investment blowouts and considerable delays in England and Finland, Australia is not likely to consider building Generation III reactors.

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The company NuScale in particular promotes a new approach to nuclear power, based on smaller modular reactors that might eventually be prefabricated and shipped to site. Although promoted as “next generation”, this technology has been used in maritime applications for many years. It might be a good choice for Australian submarines.

NuScale has licensed its design in the United States and might be able to demonstrate the first such reactor in 2027 in a research laboratory in Idaho.

These small reactors each produce 60 megawatts of power and require a much smaller initial investment than traditional nuclear power stations. They are also safer, as the entire reactor vessel sits in a large pool of water, so no active cooling is needed once the reactor is switched off.

However the technical, operational and economic feasibility of making and maintaining modular reactors is completely untested.

**Looking Ahead: Generation IV Reactors and Thorium:** If Australia decided to build a nuclear power station, it would take decades to complete. So we might also choose one of several other new reactor concepts, labelled Generation IV. Some of those designs are expected to become technology-ready after 2030.

Generation IV reactors can be divided into thermal reactors and fast breeders.

**Thermal Reactors:** Thermal reactors are quite similar to conventional Generation III light water reactors. However, some will use molten salts or helium gas as coolant instead of water, which makes makes hydrogen explosions – as occurred at Fukushima – impossible. Some of these new reactor designs can operate at higher temperatures and over a larger temperature range without having to sustain the drastic pressures necessary in conventional designs. This improves effectiveness and safety.

**Fast Breeders:** Fast breeder reactors require fuel that contains more fissile uranium, and they can also create plutonium. This plutonium might eventually support a sustainable nuclear fuel cycle. They also use the uranium fuel more efficiently, and generate less radioactive waste. However, the enriched fuel and capacity to produce plutonium means that fast breeders are more closely linked to nuclear weapons. Fast reactors thus do not fit well with Australia’s international and strategic outlook.

**Thorium reactors have not been pursued because the conventional uranium fuel cycle is so well established. The separation of U-233 from the thorium has therefore not been demonstrated in a commercial setting. India is working on establishing a thorium fuel cycle due to its lack of domestic uranium deposits, and China is developing a thorium research reactor.**

**Breeding Fuel from Thorium:** An alternative to using conventional uranium fuel is thorium, which is far less useful for nuclear weapons. Thorium can be converted in a nuclear reactor to a different type of uranium fuel (U-233). The idea of using this for nuclear power was raised as early as 1950, but development in the US

largely ceased in the 1970s. Breeding fuel from thorium could in principle be sustained for thousands of years. Plenty of thorium is already available in mining tailings.

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**Australia’s Perspective:** To choose wisely on nuclear power and the right technology in future, we can stay engaged by:

- realising a much-needed national facility to store waste from our nuclear medicine
- making our uranium exports competitive again
- driving the navy’s submarines with nuclear power, and
- possibly reconsidering the business case for a commercial spent fuel repository.

Australia has already joined the international Generation IV nuclear forum, a good first step to foster cooperation on nuclear technology research and stay in touch with reactor developments. Australia could deepen such research involvement by, for example, developing engineering expertise on thermal Generation IV reactors here. Such forward-looking engagement with nuclear power might pave a structured way for the commercial use of nuclear power later, if it is indeed needed.

*Source: Heiko Timmers is an Associate Professor of Physics, School of Science, UNSW Canberra, UNSW, <http://theconversation.com>, 15 November 2019.*

**OPINION – Rose Gottemoeller**

**Don't Let the New START Treaty Lapse**

The New START Treaty, the last and most important nuclear arms limitation agreement still in force between Russia and the United States, expires early in 2021. Perhaps it can be extended. But it has long been criticized by the Trump administration, on two points: The treaty does not limit new nuclear weapons systems that the Russians are threatening to use against us; and it does not include the Chinese, who are busily modernizing their nuclear arsenal. Those concerns are valid and cannot be ignored in any effort to renew the 10-year pact. The new Russian systems will pose a threat to the United States if they are deployed. And although China is far behind the United States and Russia in numbers of warheads, it continues to build them

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and has not said when it will stop. Nor is China bound now by any arms limitation agreement.

The administration's attention to these issues is welcome, and we should be looking for ways to resolve them. At the same time, we should recognize the benefits the New START Treaty brings to American national security. During the coming decade, the United States will be modernizing its nuclear forces. If the treaty is extended until 2026, it will continue to cap Russian deployed warheads at 1,550 and delivery systems — missiles and bombers — at 700, giving the United States a stable environment in which to modernize.

Without the treaty, things could change drastically and quickly. There is no faster way for the Russians to outrun us than to deploy more nuclear warheads on their missiles. This is not a new issue. Starting in the 1970s, the Soviets and now the Russians have built larger and heavier intercontinental ballistic missiles, or ICBMs, on which they can load more warheads at will — and they have plenty of them in storage. Ten or more warheads were estimated for the old SS-18 heavy missile, which remains deployed; it will be replaced by a new heavy missile, one of the systems that concern President Trump's administration.

If released from the current 1,550 limit on warheads, the Russians could readily add several hundred more warheads to their ICBMs, forcing the United States into a difficult targeting problem at best, and a strategic crisis at worst. The Russians, whose missiles have grown more capable of a highly

accurate first strike, might be tempted to try to knock out the strategic command and control systems of the United States.

Stability depends on such temptation never taking shape. As far-fetched as it seems, that very possibility drove both sides in the arms reduction negotiations in the 1980s and 1990s to acknowledge that we must ensure parity in numbers of deployed warheads and delivery vehicles.

We cannot afford to lose this parity. The outcome would be too dangerous to our national security. But if New START lapses, that could happen, and fast. So, it serves American interests to extend the treaty. At the same time, we need to tackle the problems that the administration has highlighted. The agreement can be extended for five years, or until it is superseded by a new treaty. Success in a new negotiation should be something that we all welcome.

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How do we treat new Russian weapons? Here, too, the pact can help. Some of the Russian systems, such as the new heavy missile, meet the definition of an ICBM under the treaty; they would therefore fall under it without any additional negotiation. The new boost-glide missile system might also be brought under the treaty, since it is launched on a version of an existing Russian ICBM. The Russians have all but said this system will be accountable under the treaty.

But if New START is not extended, Russia would be able to field both the heavy missile and boost-glide system without any constraints. New systems like the Burevestnik, a nuclear-propelled cruise missile, would take more work, since they do not fit the category of missiles defined in the treaty. Here it might be worth a straightforward discussion with the Russians: Do they really need the system? As the radioactive explosion near Arkhangelsk in August showed, the missile will

be dangerous to operate and dangerous to deploy — both for the experts handling it and the public living near its bases.

The system is not needed. For more than 30 years, since Ronald Reagan's Star Wars program was announced, the Soviets and Russians have poured money into ensuring that their missiles can penetrate defences against incoming missiles. Chaff, decoys, manoeuvring re-entry vehicles: Russia is best in class in all of these systems to keep ICBMs on course to their targets. The rationale for the new missile is that it would succeed if the ICBMs fail, but that is unlikely. This makes the Burevestnik an elaborate redundancy, and dangerous in the bargain.

Straightforward discussion may also be the way to get the Chinese to play. In the 50 years since the United States and the Soviet Union, later Russia, have been negotiating about bilateral nuclear restraint, the Chinese have never been part of the process. They have expressed restraint

through a national no-first-use policy and by keeping their nuclear arsenal small. But with their continuing nuclear modernization, we need to wonder — is China moving beyond assuring a second strike if hit first? Is it striving for parity with the United States and Russia?

Seeking some clarity about Chinese intentions should be a first order of business. The Chinese are not allergic to all negotiated measures. They are signatories of the Nuclear Non-proliferation Treaty and Comprehensive Test Ban Treaty, and they have cooperated to prevent proliferation — for example, working with the United States on nuclear security in their port complexes and elsewhere to prevent nuclear terrorism during the Beijing Olympics in 2008.

But time and patience will be needed to engage Beijing, alongside mutual goals of predictability and restraint. Early insistence that the Chinese

reduce and eliminate their relatively small nuclear arsenal would only drive them away. The Trump administration is on the right track when it draws attention to the new Russian strategic systems and the pace of Chinese nuclear modernization. We can win some progress in both of these arenas, and New START can help: Its extension would make it easier to accomplish both goals. Some of the new systems will be constrained if the treaty survives. Most important, we will maintain stability and bolster America's national security as we negotiate further. Russia will be locked in on warheads. It will not be able to outrun us.

Source: <https://thewire.in>, 08 November 2019.

**OPINION – JONATHAN RUHE**

**New Signs Iran is Creeping Closer to Making a Nuclear Bomb**

Iran's regime likes anniversaries. This month it celebrated 40 years since the U.S. embassy hostage crisis by unveiling new nuclear centrifuges and redoing anti-American murals at the site of the former embassy. In May, it marked one year since the United States left the 2015 nuclear deal by beginning its own steady departure from the agreement.

But the anniversary surprise is much more momentous. On Nov. 5, Tehran announced it would reactivate its Fordow enrichment facility, almost exactly a decade after United Nations inspectors demanded Iran close the recently discovered, illegally constructed site. Just as Fordow rang alarm bells back then, this latest news must spur more concerted efforts to address Iran's accelerating approach to nuclear weapons. This is the fourth in Iran's unfolding

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series of ultimatums for Europe to offset the pain of U.S. sanctions, otherwise Tehran increasingly violates the JCPOA every 60 days. The first escalations in May and July upped its uranium stockpile and enrichment level, initiating gradual reductions in the "breakout" time to produce enough fissile material for a bomb.

As the Jewish Institute for National Security of America (JINSA) assessed this summer, by themselves

these moves — although concerning — would still enable inspectors to detect a breakout attempt for the foreseeable future. But since then, Tehran has ratcheted up as U.S. sanctions multiplied. In September, it began enriching with newer, more productive centrifuges. This is driving Iran toward an industrial-scale nuclear program — not overnight, but no longer over the horizon, either.

And now Fordow. While Iran's specific plans remain unclear, simply reverting to the site's pre-JCPOA configuration would further shrink breakout time, if only marginally. The facility is smaller than the enrichment plant at Natanz, and it only ever housed first-generation centrifuges. But Fordow is worrisome for multiple reasons independent of how it is reactivated. Fordow is better designed and built than Natanz to withstand bunker busters — helping explain why the JCPOA prohibits enrichment there, but not at Natanz.

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a military response. Currently Iran has said it will only enrich to 4.5 percent LEU at Fordow, but this must be monitored extremely closely. Twenty percent enrichment would likely resume here, as Iranian officials have threatened,

and would entail interconnecting “tandem” centrifuge cascades.

This would cut breakout time far more precipitously than any move thus far, but it also likely would be detected by inspectors. Therefore, any attempt to block inspectors, as the regime has mulled recently, would be equally alarming. These concerns also must be placed in a larger strategic context. By itself, no single escalation to date would put Iran on the precipice of a bomb without appreciable advance warning. Yet aggregated over time, the sum of these violations already has cut breakout time appreciably since May, and will continue doing so.

Such estimates entail multiple assumptions, but Tehran’s breakout time already has fallen from roughly 11 to 12 months under the JCPOA to potentially seven to eight months now. At this rate, Iran is less than a year away from an undetectable “sneak out” capability. It could reach this threshold sooner if it deploys more advanced centrifuges, as it has since September, or escalates further at the next 60-day deadline in early January. These moves serve Iran’s pressure campaign, also playing out on the ground in the Middle East, to compel sanctions relief and build negotiating leverage for a new deal. Accordingly, Tehran insists it will reverse its nuclear moves only after sanctions are lifted or as part of talks, not before as the United States demands.

Indeed, Iran only came to the table in the first place after the discovery of Fordow in 2009 generated initial international consensus for tough sanctions. But today is different. The United States is approaching a sanctions ceiling, having already accreted such measures against nearly every aspect of Iran’s economy and regime. Meanwhile Tehran is nowhere near its ceiling for

nuclear and regional escalation, especially if the diminishing impact of additional sanctions is the only deterrent.

As Iran began enriching near 20 percent at Fordow in 2012, Israeli Prime Minister Benjamin Netanyahu drew a literal red line before the world, with the implicit threat of preventive military action. Tehran took the hint and deflected its own progress toward a bomb. Now American policymakers are racing against the shortening shadow of Iran’s nuclear progress, whether or not talks occur. Taking a page from Netanyahu’s speech, the United States can give itself real diplomatic leverage, and prevent Iran approaching the nuclear threshold, only by developing credible military deterrence against Tehran or bolstering Israel’s ability to do so.

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*Source: <https://thehill.com/>, 12 November 2019.*

#### **OPINION – N Madhavan**

##### **Is India Cyber Security Ready?**

The recent breach at the Kudankulam Nuclear Power plant and the way it was handled leave a lot to be desired. Towards end-October, social media was agog with reports of a cyber-attack at Kudankulam Nuclear Power plant. The NPCIL, on October 29, denied such a development and said both the reactors were running without ‘any operational or safety concerns. In a disturbing move, within 24 hours, NPCIL ate its own words and admitted that there indeed was an incident. Computer Emergency Response Team (CERT-In), it said, had noticed a malware attack that breached India’s largest nuclear power facility’s administrative network on September 4.

Further investigations had revealed that a user had connected a malware infected personal computer to the administrative network. NPCIL emphasised that the nuclear plant’s operational systems were separate (in technical parlance this is called an air-



gap) and the administrative network was not connected to it. Hence there was nothing to fear. What is more worrying than NPCIL's somersault was its lack of openness (the attack happened almost 55 days earlier), reluctance to share any details about the nature of the malware and, most importantly, obfuscate this grave development by saying that 'any attack on the nuclear power plant control system is not possible' as they are standalone systems.

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The malware, DTRACK, was developed by a North Korean hacker group and specialises in extracting information from a system. *The Washington Post* has quoted Virus Total, a virus scanning website owned by Alphabet (Google's parent), saying a large amount of data was stolen during the breach. This, data, the paper added, could be used to plan the next attack more efficiently. Also, NPCIL's faith on air-gap or an isolated network is laughable. Iran's Nantez Uranium Enrichment facility that was attacked in 2010 was air-gapped. The attack, the world's first use of a digital weapon, destroyed 984 centrifuges thereby setting Iran's covert nuclear weapon programme back by a few years.

The attackers — many point the finger at US and/or Israel — used the Stuxnet worm and chose not to attack Nantez directly but focussed on infecting four companies that were contracted to work in the facility.

When one of the workers from these companies used a USB drive at the Nantez facility, the worm was deployed. It destroyed the centrifuges by spinning them at dangerous speeds. Thus air-gapping is not fool-proof as NPCIL would like us to believe. With India's nuclear facilities located not too far from densely populated areas, fear of a potential nuclear meltdown (the worst

outcome of a cyber-attack) should make our policymakers paranoid over cyber threats. The way the Kudankulam incident was handled inspires very little confidence.

**Lackadaisical Approach:**

The larger issue here is whether India is prepared for cyber-attacks which are increasingly seen as the fifth dimension in warfare after air, water, land and space. The threat level is high. According to cyber

security major Symantec, India is among the top three countries in the world after the US and China when it comes to phishing and malware attacks.

Other reports reveal that its share in mobile malware (they enter through apps) is reportedly a high 23.6 per cent. In 2017, there was one security breach every 10 minutes in India. This data has to be taken with a pinch of salt as many cyber security incidents go unreported. But our approach to this serious issue is, at best, lackadaisical — be it as an individual, corporate or government. Indians still prefer to use pirated software. Hackers exploit

vulnerabilities in the software and without the frequent patches the developers send (pirated software user will not get it), the computer will be a sitting duck.

Also, they are contented with just anti-virus which is just one feature of end-point protection. Most companies do not invest in

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quality people when it comes to manning the IT team. This despite cyber security been considered as an executive-level challenge. Most companies also lack a proper cyber security framework and standard operating procedures. Even if they have one, there is a need for constant training and awareness.

Not many employees think twice before opening

attachments or inserting a USB drive. Weak passwords are a bane and reminders to periodically change them are often met with a frown. With companies now adopting bring your own device (BYOD) policy, risks have only risen. Under the circumstances, businesses need to constantly test compliance through periodic audits. Those in critical sectors must also do vulnerability testing and even get ethical hackers to test their defences. Very few do this.

**Lessons from Estonia:** India cannot be cyber security ready unless the issue is taken up on a mission mode and in this Estonia, the northern-most of the three

Baltic States, has some lessons for us. When this tiny nation (population 1.3 million) broke away from Soviet Union in 1991, it barely had any infrastructure, physical or digital. Today, it is one of the most digitalised countries in the world. All government services are delivered online. As much as 99.6 per cent of the banking transactions are done digitally. All the schools have been digitised and exams, homework and attendance are available at the click of a mouse. In fact, 28 per cent of people voted online in the last Parliamentary elections in 2018. In 2007, Estonia was subjected to a brutal cyber warfare (Russia is blamed for it).

The Distributed Denial of Service (DDOS) attack crippled 58 Estonian websites. ATMs did not work. Online banking services failed and media houses could not broadcast news. Estonia adopted a transparent approach to this incident and cut itself off from rest of the Internet. It managed to defend itself well. It was a wake-up call. It learned from the experience and built a strong intrusion detection and protection systems, created awareness among people, built a strong public-private partnership to tap resources, put in place a central system for monitoring, reporting and resolving cyber incidents and mandated vital service providers to assess and manage their ICT

risks regularly.

It also created a voluntary Cyber Defence Unit where experts who work elsewhere chip in to protect when called. Estonia has also become proactive on cyber security. It ensured that NATO Co-operative Cyber Defence Centre of Excellence was set up in its capital Tallinn. Its annual

scenario-based real time network defence exercise, Locked Shields, conducted since 2010 is considered the world's largest and most complex. Today, when it comes to cyber security Estonia is among the top five nations in the world (India is not in the top 20). Recently, it has offered to help India on this front. We

should grab this opportunity with both our hands.

Source: <https://www.thehindubusinessline.com>, 07 November 2019.

**OPINION – Nancy Jo Nicholas, Thom Mason**

### **Artificial Intelligence can Help Stop Nuclear Proliferation**

The international nuclear arms control regime is approaching a critical juncture. If new nuclear weapons treaties are to be negotiated, ratified and enforced, they will need to be underpinned by strong technical monitoring capabilities. The Department of Energy's National Nuclear Security Administration is leveraging its expertise and technology to meet this challenge, understanding that in nuclear non-proliferation, you can't verify what you can't see. The United States is placing renewed urgency on developing the science and technology required to monitor our adversaries' nuclear activity — specifically by harnessing the power of artificial intelligence and the unmatched, high-performance computing capabilities found at DOE's national laboratories.

DOE houses four of the world's top 10 fastest supercomputers, including the top two, and we are already at work on developing three next-generation, exascale machines, able to conduct

a billion calculations per second. Coupled with our advances in AI, those technologies will strengthen our non-proliferation efforts while helping to ensure that our own nuclear weapons stockpile remains safe, reliable and effective. At Los Alamos National Laboratory, we are using AI to sift through data from an international network of sensors that look for underground seismic events that could indicate an illicit nuclear explosive test. With more than half a million seismic events worldwide each year, automated calculations are required to distinguish potential nuclear explosions from naturally occurring earthquakes.

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Similarly, a team at Los Alamos is using AI to pinpoint the source of an underground nuclear explosion using signatures from gases that seep to the surface through rock fractures. Those gases may be driven hundreds of yards away from a detonation via a variety of paths, and so determining where to best place sensors to pick up the signal has proved exceptionally challenging, especially in areas where the structure of the rock is uncertain.

**AI offers the potential to accelerate our physics-based models so we can account for the numerous combinations of seepage pathways to calculate uncertainties related to when a gas is most likely to reach the surface. That in turn will allow us to deploy sensors to the correct locations for the best chance of detection. We are also using AI to fuse together disparate, heterogeneous data streams, such as social media posts, satellite imagery and weather data to look for signs of nuclear proliferation.**

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While on their own each of these data points might not tell us much, when combined, they tell us quite a lot. To fuse this data and glean relevant information requires both advanced data analytics

— sophisticated algorithm development for signal detection, natural language processing and data fusion — and advanced computing infrastructure to process that data. In short, the DOE's supercomputers can sift through these immense data sets and "learn" how to recognize patterns of nuclear proliferation with unprecedented speed.

Our supercomputers, like "El Capitan," the recently announced NNSA exactable machine to be built at Lawrence Livermore National Laboratory, will also use AI to analyse satellite images to look for changes in topography

that could indicate an underground nuclear explosion, while other remote sensing satellites search for anomalies that could indicate a space-based nuclear detonation. In many ways, AI is no longer an option but a necessity. We are awash in data from myriad sources — from dew points to Gross Domestic Products, polling numbers to Twitter trends. Each day, an estimated 2.5

quintillion bytes of data are created — the equivalent of the contents of the entire Library of Congress being produced more than 166,000 times. This will only increase as we develop new, faster and less expensive ways to collect data, such as compact, high-resolution imagers to be carried aboard CubeSats, satellites about the size of a loaf of bread that can be launched by the dozens per year. To be able to act on those immense data sets in time to make a difference, we need to be able to quickly analyse it. The

combination of DOE and NNSA's unrivalled supercomputers and AI will make that possible. While the nuclear threat is not new, the dynamic global environment has created a renewed sense of urgency related to nuclear materials and the need to monitor them — and AI is key to that. At Los Alamos, we like to say that it takes a weapons lab to find a weapons lab — because our expertise gives us insight few others in the world possess. Continuing to push the boundaries of AI will give us the tools we need to keep our Nation and the world safe.

Source: <https://www.santafenewmexican.com/>, 09 November 2019.

**The combination of DOE and NNSA's unrivalled supercomputers and AI will make that possible. While the nuclear threat is not new, the dynamic global environment has created a renewed sense of urgency related to nuclear materials and the need to monitor them — and AI is key to that.**

stopping a Soviet attack with conventional weapons. From the moment it was formed, NATO relied on the threat of nuclear escalation — whether rapid and spasmodic, or gradual and controlled — to maintain deterrence. American thinkers

developed elaborate models and theories of deterrence. U.S. and NATO forces regularly carried out exercises simulating the resort to nuclear weapons to make this strategy credible.

After the Cold War ended, the U.S. and its allies had the luxury of thinking less about nuclear deterrence and war-fighting. Tensions with Russia receded and nuclear strategy came to seem like a relic of a bygone era. Yet today, with Russia rising again as a military threat, the grim logic of nuclear statecraft is returning. The spike in tensions between Russia and the West over the past half-decade has revealed a basic problem: NATO doesn't have the capability to prevent Russian forces from quickly overrunning Estonia, Latvia and Lithuania. Russian invaders would be

at the gates of the Baltic capitals in two to three days; existing NATO forces in the region would be destroyed or swept aside. NATO could respond by mobilizing for a longer war to liberate the Baltic countries, but this would require a bloody, dangerous military campaign. Critically, that campaign would require striking targets — such as

**Reports by the nonpartisan Rand Corporation shows that the possibility of nuclear escalation in a conflict between the NATO and Russia over the Baltic region is higher than one might imagine. The best way of averting it? Invest more in the alliance's conventional defence. There was a time when it seemed quite normal to risk nuclear war over the sanctity of European frontiers.**

## NUCLEAR STRATEGY

### RUSSIA

#### How Russia could Force a Nuclear War in the Baltics

Would the United States fight a nuclear war to save Estonia? The question would probably strike most Americans as absurd. Certainly, almost no one was thinking about such a prospect when NATO expanded to include the Baltic states in 2004.

Yet a series of reports by the nonpartisan Rand Corporation shows that the possibility of nuclear escalation in a conflict between the NATO and Russia over the Baltic region is higher than one might imagine. The best way of averting it? Invest more in the alliance's conventional defence. There was a time when it seemed quite normal to risk nuclear war over the sanctity of European frontiers. During the Cold War, NATO was outnumbered by Warsaw Pact forces, and it would have had great difficulty

air defence systems — located within Russia, as well as suppressing Russian artillery, short-range missiles and other capabilities within the Kaliningrad enclave, which is situated behind NATO's front lines.

Moreover, this sort of NATO counteroffensive is precisely the situation Russian nuclear doctrine

seems meant to avert. Russian officials understand that their country would lose a long war against NATO. They are particularly alarmed at the possibility of NATO using its unmatched military capabilities to conduct conventional strikes within Russian borders. So, the Kremlin has signalled that it might carry out limited nuclear strikes — perhaps a “demonstration strike” somewhere in the Atlantic, or against NATO forces in the theatre — to force the alliance to make peace on Moscow’s terms. This concept is known as “escalate to de-escalate,” and there is a growing body of evidence that the Russians are serious about it.

A NATO-Russia war could thus go nuclear if Russia “escalates” to preserve the gains it has won early in the conflict. It could also go nuclear in a second, if somewhat less likely, way: If the U.S. and NATO initiate their own limited nuclear strikes against Russian forces to prevent Moscow from overrunning the Baltic allies in the first place. And even the limited use of nuclear weapons raises the question of further escalation: Would crossing the nuclear threshold lead, through deliberate choice or miscalculation, to a general nuclear war involving intercontinental ballistic missiles, strategic bombers and apocalyptic destruction?

So, what to do? One option would be for the West to pull back — to conclude that any game that involves risking nuclear war over the Baltic states is not worth the candle. The logic here is superficially compelling. After all, the U.S. could survive and thrive in a world where Russia dominated Estonia, Latvia and Lithuania, just as it survived and thrived during the Cold War, when those countries were part of the Soviet Union. The problem is that failing to defend the Baltic states would devalue the Article 5 guarantee on which NATO rests: the principle that an attack on one is an attack on all. And given that one

could raise similar questions about so many U.S. commitments — would declining to meet a Chinese attack on the Philippines really endanger America’s existence? — this failure could undermine the broader alliance system that has delivered peace and stability for so many decades.

A second option, emphasized by the Pentagon’s 2018 Nuclear Posture Review, would be to devise new limited nuclear options as a way of strengthening deterrence and dissuading Russia from pursuing a strategy of escalate to de-escalate. For example, the U.S. might develop low-yield nuclear weapons that could be used, in a relatively limited fashion, against a Russian invasion force or the units supporting it.

**A second option, emphasized by the Pentagon’s 2018 Nuclear Posture Review, would be to devise new limited nuclear options as a way of strengthening deterrence and dissuading Russia from pursuing a strategy of escalate to de-escalate. For example, the U.S. might develop low-yield nuclear weapons that could be used, in a relatively limited fashion, against a Russian invasion force or the units supporting it.**

This approach is probably worthwhile, because it would help fill in missing steps on the escalatory ladder between

conventional conflict and general nuclear war. The knowledge that the U.S. has its own “tactical” nuclear options might inject greater caution into the calculations of Russian planners. It is possible, Rand analysts note, that limited nuclear strikes early in a Baltic conflict could convince the Kremlin that the risks of proceeding are unacceptable. The dangers here are, well, obvious and drastic. There is always some possibility — although informed analysts debate how much of a possibility — that Russia might mistake a limited strike against military targets in the Baltics for part of a larger or more dangerous nuclear strike against Russia itself. And if the plan is to use limited nuclear strikes against Russian military assets involved in an invasion of the Baltic states, the implication is that NATO would be using nuclear weapons on the territory of its own members.

A third, and best, option is to strengthen the weak conventional posture that threatens to bring nuclear options into play. The root of NATO’s nuclear dilemma in the Baltics is that the forces it

has stationed there cannot put up a credible defence. Yet as earlier studies have noted, the U.S. and its allies could make a Russian campaign far harder and costlier — with a much-diminished chance of rapid success — by deploying an enhanced NATO force of seven to eight brigade combat teams, some 30,000 troops. That force would include three or four armoured brigade combat teams (as opposed to the one NATO periodically deploys to Eastern Europe now), along with enhanced mobile air defences and other critical capabilities.

Russia couldn't claim credibly that such troops posed any real offensive threat to its territory. But the force would be large and robust enough that Russian troops couldn't destroy it in a flash or bypass it at the outset of a conflict. It would therefore obviate many of the nuclear escalation dynamics by making far less likely a situation in which NATO must escalate to avoid a crippling defeat in the Baltics, or one in which Russia can escalate to protect its early victories there.

Developing this stronger conventional deterrent in the Baltics would not be cheap: Estimates run from \$8 billion to \$14 billion in initial costs, plus \$3 billion to \$5 billion in annual operating expenses. Yet neither would it be prohibitive for the richest alliance in the world. The best way of reducing the danger of a nuclear war in the Baltics is to ensure that NATO won't immediately lose a conventional one.

Source: <https://www.japantimes.co.jp/>, 12 November 2019.

## **BALLISTIC MISSILE DEFENCE**

### **USA**

#### **PAC-3 Interceptor Hits Two Ballistic Missiles during Test**

Two Patriot Advanced Capability-3 Cost Reduction Initiative interceptors successfully hit two ballistic missile targets at White Sands Missile Range, New Mexico, according to Lockheed

Martin. The demonstration was meant to support the U.S. Army's Field Surveillance Program by ensuring the reliability and readiness of PAC-3 missiles already fielded by the service. The Army-led missile defence flight test demonstrated the weapon's hit-to-kill capability and was observed

**The Army-led missile defence flight test demonstrated the weapon's hit-to-kill capability and was observed by representatives from the service as well as current and potential PAC-3 customers. Lockheed's PAC-3 CRI is a high-velocity interceptor that defends against incoming threats, such as tactical ballistic missiles, cruise missiles and aircraft.**

by representatives from the service as well as current and potential PAC-3 customers. Lockheed's PAC-3 CRI is a high-velocity interceptor that defends against incoming threats, such as tactical ballistic missiles, cruise missiles and aircraft.

"Today's global security environment demands reliable solutions. We expect PAC-3 interceptors to continue serving as an essential element in integrated, layered defense systems," said Jay Pitman, vice president of PAC-3 programs at Lockheed Martin Missiles and Fire Control. Countries that have purchased the PAC-3 include the US, Germany, Kuwait, Japan, Qatar, South Korea, Saudi Arabia, Taiwan, the Netherlands, the United Arab Emirates, Romania, Poland, Sweden and Bahrain.

Source: <https://www.defensenews.com/>, 10 November 2019.

## **NUCLEAR ENERGY**

### **CHINA**

#### **Chinese Envoy Encourages IAEA to Further Promote Peaceful Uses of Nuclear Energy**

A Chinese UN envoy encouraged the IAEA to further promote the peaceful uses of nuclear energy. After listening to the agency's report on its work, Chinese Deputy Permanent Representative to the United Nations Wu Haitao said the steady development of global nuclear energy and the wider application of nuclear technology are playing an increasingly prominent role in promoting social and economic development, ensuring energy security and tackling climate change.

He stressed the need for the IAEA to vigorously push for the peaceful uses of nuclear energy. Wu said the agency should, in response to the worldwide nuclear energy development and the needs of its member states, increase resource input and continue to provide vigorous support to member states in developing and using nuclear energy, and apply nuclear technology on a wider scale.

He also noted that the agency should provide more technical and funding support and assistance to developing countries, and actively promote international cooperation so that the benefits of nuclear energy can be shared by all. Moreover, the Chinese envoy noted that the work of the IAEA is conducive to the implementation of the Paris Agreement on climate change and the sustainable development goals of the UN 2030 Agenda.

On the healthy and safe development of nuclear energy, he said the IAEA should continue to actively prepare the nuclear safety standards on nuclear security guidance, strengthen peer review services, assist member states in capacity building and exchange and share experiences, so as to build a high-standard global nuclear safety and security system. In the meantime, Wu noted that the international security situation is going through complex and profound changes, and that nuclear non-proliferation and nuclear security challenges are mounting, while the threat of nuclear terrorism is not to be overlooked.

On the IAEA's role in facilitating a political and diplomatic settlement of nuclear hotspot issues, he said China commends the agency for its effort in facilitating the implementation of the Iran nuclear deal and that China supports the agency in continuing to fulfil its monitoring and verification mandate objectively and impartially. With regard to China's role, Wu said China has been actively promoting the safe and efficient development of nuclear energy. ...He noted that China also

steadfastly supports the IAEA in fulfilling its safeguards mandate and maintaining the international non-proliferation regime.

"China stands ready to deepen comprehensive cooperation with the agency and make our new contributions to the cause of international security and development," he pledged. As an organization within the UN family, the IAEA is the world's central intergovernmental forum for scientific and technical cooperation in the nuclear field. It aims to work for the safe, secure and peaceful uses of nuclear science and technology.

*Source: [http://www.xinhuanet.com/english/2019-11/12/c\\_138547385.htm](http://www.xinhuanet.com/english/2019-11/12/c_138547385.htm), 12 November 2019.*

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## **IRAN**

### **Iran Begins Constructing Second Nuclear Reactor at Bushehr Plant**

Iran began constructing a second nuclear reactor at its Bushehr power plant - a facility being fuelled by uranium enriched further

than the limits outlined in the faltering 2015 nuclear deal with world powers. While celebrating the start of construction, Iranian officials also condemned United States pressure campaign of sanctions that blocks Tehran from exporting its crude oil.

On 10 November, trucks with spinning concrete mixers poured their slurry into the prepared base of the second reactor as journalists watched in Bushehr, some 700km (440 miles) south from Iran's capital, Tehran. Bushehr's working reactor stood behind it.

Officials said the new reactor - and a third planned to be built - will each add more than 1,000 megawatts to Iran's power grid. It is being built with the help of Russia, which helped finally put Bushehr's first reactor online in 2011 after decades of delays. "Nuclear power provides reliable electricity ... and each power plant saves

us 11 million barrels of oil or \$660m per year," Ali Akbar Salehi, head of the Atomic Energy Organization of Iran, said in a televised ceremony.

The sanctions were imposed after President Donald Trump unilaterally withdrew the US from the historic nuclear accord in May 2018, lighting the fuse for the current tensions now gripping the Middle East. "It was not us who started breaking commitments, it was them who did not keep to their commitments and cannot accept the nuclear deal as a one-way roadmap," said Salehi.

Bushehr works with uranium produced in Russia, not Iran, and is monitored by the United Nations' IAEA. However, Iran began 4.5 percent enrichment in part to supply Bushehr despite the deal limiting it to 3.67 percent. While that is still nowhere near weapons-grade levels of 90 percent, nonproliferation experts warn Iran's growing stockpile and increasing enrichment will begin to shave off time from the estimated one year Tehran would need to gather enough material for an atomic bomb.

Iran long has maintained its nuclear programme is for peaceful purposes, but the deal was designed to limit its enrichment in exchange for the lifting of international sanctions. Allegations rebuffed: Also, Iran's foreign ministry spokesman rejected claims by the US and Israel over allegations of nuclear material being discovered at an undeclared site outside of Tehran.

An IAEA meeting appeared to include discussions over what Israeli Prime Minister Benjamin Netanyahu described in a US speech in 2018 as a "secret atomic warehouse". The IAEA has said Iran "carried out activities relevant to the development of a nuclear explosive device" in a "structured programme" through the end of 2003. Israeli officials allege material recovered from the warehouse came from that programme. "The

Zionist regime and others are trying to reopen this case. We don't accept this and we condemn these efforts," Mousavi said. "We have announced that this is a trap," he said. "Hopefully the IAEA will maintain its vigilance."

Iran previously denied the claims about the warehouse by Israel, which has its own undeclared nuclear weapons programme. The IAEA released no information on the alleged warehouse at a board meeting, but is expected to release a quarterly report on the Iran nuclear deal.

Source: <https://www.aljazeera.com/>, 10 November 2019.

## NUCLEAR COOPERATION

### GENERAL

#### Enhancing Cooperation for Effective Nuclear and Radiation Regulatory Systems: IAEA Conference Begins

... Patient and worker protection in radiation medicine and the interface between safety and security, as well as experiences in decommissioning nuclear installations, are at the core of the conversation taking place in The Hague. Over 250 of the world's nuclear and radiation

regulators are discussing these topics and more, at an international conference focused on the role of the global regulatory community in ensuring nuclear and radiation safety and security.

The four-day International Conference on Effective Nuclear and Radiation Regulatory Systems: Working Together to Enhance Cooperation, covered safety and security aspects of regulating nuclear installations, radiation sources and medical facilities; leadership and management needs for ensuring safety and security; ways of strengthening international cooperation, and cross-cutting regulatory areas such as education

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and training, and human resource development.

In his opening address, Carl-Magnus Larsson, Chief Executive Officer of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and Conference President, highlighted the challenges of ageing facilities and an ageing workforce. He stressed the importance of a holistic approach to safety and security that takes the technical, managerial, organisational and behavioural factors into account in dealing with these challenges.

“We all know when we talk about safety, radiation protection, physical protection, security of assets and information, emergency preparedness and response, or any other aspect of practices that involve radiation, we actually talk about people,” he said at the event opening. “Education, training, recruitment, awareness, leadership and management for safety, and communication, are all essential elements and they all sit with people.”

Speaking at the event, Juan Carlos Lentijo, IAEA Deputy Director General and Head of the Department of Nuclear Safety and Security, highlighted the importance of cooperation in improving regulatory effectiveness worldwide. He stressed the need for sharing information related to capacity building for regulatory infrastructure, effective knowledge management and a strong culture of safety and security. “Though the regulation of safety and security are the responsibility of individual Member States, international cooperation helps all do better,” he said.

The conference, [took] place from 4 to 7 November in The Hague, Netherlands, is the fifth in a series of International Conferences on Effective Regulatory Systems, and is organized by the IAEA in cooperation with the European Commission's Joint Research Centre. The first Conference was

held in 2006 in Moscow, followed by Cape Town in 2009, Ottawa in 2013 and Vienna in 2016.

Each event has built upon its predecessor to enhance international cooperation in supporting countries embarking on nuclear power programmes; strengthen regulatory interfaces between nuclear and radiation safety and security, in terms of how each field's measures and requirements could potentially impact one another, and improve the management of cross-cutting regulatory areas based on past lessons learned.

Other speakers who gave opening addresses at the conference included Maria Betti, Director Nuclear Safety and Security of the European Commission, Jan van den Heuvel, Chairman of the Authority for Nuclear Safety and Radiation Protection of the Netherlands and Hua Liu, Vice Minister of Ministry Ecology and Environment and Administrator of the National Nuclear Safety

**Through its Safety Standards and Nuclear Security Guidance, the IAEA assists national authorities in the management of radioactive sources from cradle to grave, and in strengthening their nuclear safety and nuclear security infrastructure. The IAEA also offers peer review and advisory services as part of its assistance to help ensure the application of its safety standards and security guidance documents.**

Administration of China and 2016 Conference President. The conference will feature a special panel session focusing on emergency preparedness and response in transnational emergencies, as well as public communication in nuclear and radiological emergencies, and the application of the INES.

**IAEA Support towards Effective Regulatory Systems:** The IAEA supports countries embarking on nuclear power programmes in the development of their regulatory frameworks and strengthening their regulatory infrastructure. The Agency also provides capacity building support for the regulation of Small and Medium sized or Modular Reactors and research reactors, and for strengthening countries' emergency preparedness and response arrangements. Through its Safety Standards and Nuclear Security Guidance, the IAEA assists national authorities in the management of radioactive sources from cradle to grave, and

in strengthening their nuclear safety and nuclear security infrastructure. The IAEA also offers peer review and advisory services as part of its assistance to help ensure the application of its safety standards and security guidance documents.

Source: <https://www.iaea.org/>, 04 November 2019.

**GERMANY–BRAZIL**

**Germany Extends Controversial Nuclear Deal with Brazil**

The Green party sought to scrap the agreement, citing safety concerns. However, the government in Berlin says it is committed to its longstanding deal over the “peaceful use of atomic energy” with Brazil. Germany’s parliament, the Bundestag, ignored pleas from the Green party to scrap a nuclear agreement with Brazil. ... The deal, signed in 1975, pertains to the “peaceful use of atomic energy,” that is, the construction of nuclear power plants. It was originally negotiated by Brazil’s military dictatorship and the SPD government of Helmut Schmidt.

**Concerns over Safety Standards, Bolsonaro:** But Sylvia Kotting-Uhl, the Green party chairwoman of the Bundestag’s environmental committee, said there is no reason to maintain the treaty. The agreement comes up for a vote for extension or termination every five years. “We requested the agreement be terminated five years ago,” Kotting-Uhl told DW. “At the time, the government claimed that maintaining the deal would allow Germany to influence safety standards for Brazil’s nuclear power plants. Meanwhile that has been proven false. Brazil’s safety standards are entirely opaque. The German government has no idea what they even are.”

Moreover, added Kotting-Uhl, with the election of

far-right President Jair Bolsonaro, Brazil now has a leader with a long-term plan to develop nuclear weapons. “He wants to complete the fuel cycle, that means the risk of Brazil producing weapons-grade material is very high,” she said. The Green party request to terminate the deal notes that Germany, a country that has declared it no longer has faith in nuclear energy, must send a signal to Brazil: “Germany’s planned 2022 national nuclear phaseout should guide its policy within Europe and across the world. Germany could be a role model for the global phaseout of nuclear energy.”

Brazil generates the majority of its energy through hydroelectric power plants. Nuclear energy, produced by Brazil’s two existing nuclear power plants, currently contributes very little of the country’s overall energy supply. Brazil plans on building a third nuclear facility, Angra 3, in the near future.

**There are no foreign policy or energy policy considerations that would necessitate termination of, or amendments to the nuclear agreement with Brazil. The cooperation agreement on the peaceful use of nuclear energy affords, among other things, the German government the opportunity to exert influence over improvements to safety standards at Brazilian nuclear facilities.**

Materials for the Angra site, named for the coastal city of Angra dos Reis where it is to be located, have been in storage for decades. Many of its components were produced in Germany. Construction of the facility was scheduled to begin years ago, and now most of its parts are considered obsolete. That means the design for Angra 3 is similar to German nuclear power plants taken offline years ago. Furthermore, geologists say the Angra area is prone to landslides, raising further safety concerns.

**Berlin doesn’t Want a New Fight:** Yet, after the cancellation of financial assistance for the Amazon rainforest this summer led to friction between Brazil and Germany, the government in Berlin seems keen to avoid starting a new conflict. Back in 2018, the German government justified its commitment to maintaining the agreement, despite objections from the Greens, by again arguing it would improve safety standards in Brazil: “There are no foreign policy or energy policy considerations that would

necessitate termination of, or amendments to the nuclear agreement with Brazil. The cooperation agreement on the peaceful use of nuclear energy affords, among other things, the German government the opportunity to exert influence over improvements to safety standards at Brazilian nuclear facilities.”

Now, despite concerns about Bolsonaro, the treaty has been extended for another five years. Bolsonaro’s government is currently planning to move ahead with construction of the Angra 3 plant, with completion slated for 2026. Cost projections, originally pegged at €2.1 billion (\$2.3 billion), have now soared to €5.6 billion.

Source: Jens Thurau, <https://www.dw.com/>, 14 November 2019.

## **USA–SAUDI ARABIA**

### **US Confirms Saudi Arabia Nuclear Energy Talks**

A senior US official has confirmed that Washington is in talks with Riyadh about supporting Saudi Arabia’s planned nuclear programme. Speaking in Abu Dhabi on 26 October, US Energy Secretary Rick Perry confirmed that talks were ongoing. Perry told the forum that Saudi Arabia’s leadership in Riyadh wanted to sign a ‘123 Agreement’ with the United States. A 123 Agreement is section of the US’ Atomic Energy Act of 1954 that sets out rules governing US nuclear cooperation with other nations.

Under the terms of a 123 Agreement, Riyadh must sign an accord with Washington committing to the peaceful use of nuclear technology before US companies can compete for its nuclear energy projects in Saudi Arabia. The US has an existing 123 agreement with 48 countries to date, according to the news agency MEED. Riyadh is reported to have been unwilling to commit to a deal that would rule out the possibility of enriching uranium or reprocessing spent fuel.

**Saudi Arabia’s Nuclear Energy Programme:** In November 2018, Saudi Arabia’s King Abdullah City for Atomic & Renewable Energy (KA-Care), the body overseeing the kingdom’s nuclear energy plans, appointed Australia’s WorleyParsons to the project management office consultancy role for the programme. WorleyParsons will provide consultancy services including project governance, resource management, project services, training and compliance across the full scope of the large nuclear power plant (LNPP), small modular reactors and nuclear fuel cycle. The majority of the nuclear power capacity will be developed through conventional large-scale nuclear facilities, the first of which will be a two-reactor 2.8GW plant.

KA-Care announced in August last year that it had awarded a contract to France’s Assystem to carry out site characterisation studies, including

geological surveys and environmental impact studies for the first planned project. The studies will allow Saudi Arabia to choose the most suitable site on which to build, as well as provide important technical details for the design of the project.

MEED had reported in early 2018 that the kingdom was assessing two potential locations for the NPP. The two shortlisted are at Umm Huwayd and Khor Duweihin. Both can be found on the coast near the UAE and Qatari borders.

The two sites were shortlisted following investigations conducted in 2011 and 2012, in accordance with sitting guidance issued by international regulatory agencies, including the IAEA and the US Nuclear Regulatory Commission (NRC). Companies are positioning themselves for the contract to build the first nuclear power plant. In July last year, Russian state nuclear company Rosatom said it has been shortlisted to participate in the tender for Saudi Arabia’s first nuclear power plant.

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According to a report in the Saudi Gazette, Rosatom will be invited to participate in the upcoming tender by KA-Care. Earlier in July, South Korea's energy ministry revealed that state utility provider Korea Electric Power Corporation (Kepeco) had made the shortlist for the first Saudi nuclear power tender.

In addition to developing nuclear power capacity through large scale nuclear reactors, the kingdom is also planning to develop atomic energy through a series of smaller system-integrated modular advanced reactor technology (Smart) nuclear power plants in the kingdom in partnership with South Korea. MEED reported in October last year that progress had been made with the Smart programme, and engineering work for two Smart units will be completed in November.

South Korea and Saudi Arabia have already invested more than SR487m (\$129.8m) in plans for Smart nuclear reactors across the kingdom. Riyadh signed a memorandum of understanding (MoU) with South Korea in November 2016 to develop the technology. The Smart reactors are expected to have a capacity of about 100MW each. The third pillar of Saudi Arabia's nuclear energy programme will involve mining uranium resources to fuel the plants sources close to the kingdom's nuclear programme have told MEED. Developing the kingdom's mining sector is a key pillar of the Saudi Vision 2030 that was launched in April 2016.

Source: <https://www.power-technology.com/>, 11 November 2019.

NUCLEAR PROLIFERATION

IRAN

**Iran's Strategy of Reducing its Commitments under the Nuclear Deal is Risky and Could Backfire**

After the United States' withdrawal from the Iran nuclear deal, (JCPOA), and the re-imposition of even harsher sanctions on Tehran, coupled with Europe's inability or unwillingness to provide Iran with relief from the rigors of U.S. sanctions, Tehran adopted a strategy based on demonstrating the dangers of the U.S. policy of maximum pressure on Iran.

In response to sanctions on Iranian oil sales, Iran has shown that it can make the Persian Gulf, and specifically the Strait of Hormuz, unsafe for all users, which in effect demonstrates how it can inflict heavy damage on the global economy. This aspect of Iran's strategy lines up with statements by Iranian officials that if Iran cannot export its oil, no other country can either. The capture of a British-owned tanker, plus attacks on UAE-owned ships and on Saudi oil installations, which were blamed on Tehran, also served this purpose.

Another tactic of Iran's counter-maximum pressure strategy has been the gradual reduction of Iran's commitments under the JCPOA, which recently included the injection of

gas into centrifuges in Fordow, a move that is prohibited under the JCPOA. However, all the nuclear-related actions have been performed under IAEA supervision. Moreover, Iran has insisted that these actions do not signal its desire to exit the

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JCPOA. Rather they are aimed at convincing the Europeans to do more to ease Iran's economic burdens and to pressure the United States to lift the economic sanctions on Iran and thus save the nuclear agreement.

Iranian authorities have also repeatedly stated that all these actions are reversible and that the door to diplomacy is still open. All that is needed, Iran's leaders say, is the U.S. willingness to lift, or at least ease, the most crippling aspects of the sanctions regime. Some Iranian commentators have even hinted that, without sanctions relief, Iran might leave the NPT.

**Failure of Iran's Strategy and Future Risks:**

So far, however, Iran's strategy of scaring the United States and Europe into ending economic sanctions on Tehran in exchange for its return to the full implementation of its commitments under the JCPOA has failed. The reasons for this failure are fairly obvious. None of Iran's actions so far pose a serious threat to the United States or Europe. By contrast, it could entail

heavy losses for Iran. For instance, although Iran can in theory block the Strait of Hormuz for a short period of time, such action would expose it to military retaliation by the US and possibly even Europe. Such an action would also alienate Iran's few remaining international interlocutors, including China and Russia.

Nor are Iran's backpedalling on its nuclear commitments worrying enough to produce a change of heart on the part of the United States and Europe. Despite all the hype in the last two decades about Iran's ability to produce a nuclear device in a relatively short time, Tehran is no position to do so. If such fears had been real, some kind of pre-emptive military strike on its nuclear facilities would have taken place long before. Should Iran continue to reduce its commitments,

it would only embolden hawkish politicians in America and Europe, as well as Middle East actors, to push for such a pre-emptive strike. Such actions would, of course, entail costs for Western and Middle Eastern actors as well, including the risk of triggering a region-wide war in the Middle East. However, Iran would be the biggest loser in such a war.

Even if this worst-case scenario did not materialize, Iran could face even more pressure. For instance, its nuclear dossier could be once again sent to the United Nations' Security Council

to be placed under the UN Charter's chapter seven dealing with threats to international security. This act could pave the way for a UN-sanctioned military action against Tehran.

The fact is that in this contest of wills. Iran is in a much weaker position than its antagonists. The present situation does not present any of the major international actors with serious security and economic threats. The United States, Europe, and other players can

essentially wait Iran out. Whatever retaliatory capacity Iran might have is ultimately more damaging to itself. Iran can block the Strait of Hormuz. But this is certain to invite military retaliation by the United States. Meanwhile, Iran's economic and financial problems, notwithstanding claims that its economy is on the way to recovery, has nearly stopped its developmental programs and is fuelling popular discontent.

**What an Alternative Strategy should Look Like?**

If the current strategy pursued by Tehran is unlikely to succeed and is full of risks, what should Iran do next? Given the position of Iran's Supreme Leader, Ali Khamenei, on the question of talks with the United States, the divided nature of the Iranian polity and the Trump administration's

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unwillingness to change its position on its preconditions for possible reduction of American sanctions, to suggest that the two sides should talk is useless. This situation leaves Iran with few viable options. Nevertheless, there are policies Tehran can pursue that could reduce the risks of further economic and political pressures.

First, Tehran should realize the futility of its current strategy of reducing its nuclear commitments or threatening to leave the NPT. Instead, it should take the high ground and show that, unlike the U.S., it respects its commitments. Second, Iran could gain some goodwill with the U.S. and Europe by freeing their nationals, including those who also have Iranian citizenship. The damage done to Iran by such arrests far outstrips any imaginable benefits. Keeping these prisoners as bargaining chips is also ineffective. Third, the Iranian leadership should allow more cultural liberalization and show more tolerance towards political dissent.

The cultural policies of the Iranian leadership have had serious economic costs. It has encouraged capital flights to places such as Dubai, Turkey, Europe, the Americas, and even places such as Armenia and Georgia. According to reports in the Iranian media, the number of Iranians buying houses in Turkey have sharply increased this year. Meanwhile, perpetual political tensions and risks of military conflict has acted as a barrier to investment by Iranian themselves in their own country. Eventually, Iran would have to develop a more realistic and positive foreign policy agenda than one based on the slogan of anti-imperialist struggle. An alternative agenda would focus on advancing Iran's national interests rather than chasing unrealistic goals. In the meanwhile, its leadership can at least refrain from doing things that are certain to cause it more damage.

Source: <https://lobelog.com>, 12 November 2019.

## NORTH KOREA

### North Korea Assails US, South Korea and UN Nuclear Agency

North Korea's UN Ambassador Kim Song made the accusations in a speech to a General Assembly meeting on the IAEA, which he accused of "ignorance of the prevailing reality of the Korean peninsula." Kim said relations between the US and North Korea "have made little progress" since the June 2018 summit between their leaders, "and the situation of the Korean peninsula has not extricated itself from the vicious cycle of aggravated tension." He said this is "entirely attributable to the political and military provocations perpetrated by the US".

**Given the position of Iran's Supreme Leader, Ali Khamenei, on the question of talks with the United States, the divided nature of the Iranian polity and the Trump administration's unwillingness to change its position on its preconditions for possible reduction of American sanctions, to suggest that the two sides should talk is useless. This situation leaves Iran with few viable options.**

Since the start of nuclear talks last year, the US and South Korea have cancelled or scaled back regular military drills to create space for diplomacy. But North Korea sees any drills as a rehearsal for an invasion. Nuclear diplomacy has largely remained deadlock since a second summit between US President Donald Trump and North Korean leader

Kim Jong Un failed in February.

In recent months, North Korea has been trying to pressure the United States after demanding that Washington make new proposals to revive nuclear diplomacy by the end of December. Kim, the North Korean UN envoy, told the 193-member General Assembly that since last year his country his country has made "proactive efforts in good faith ... to establish a lasting peace regime on the Korean peninsula." He said North Korea has refrained from testing nuclear weapons and intercontinental ballistic missiles for more than 20 months. Kim said "the key" to consolidating peace and security is implementation of the joint statement the leaders adopted at last year's Singapore summit.

As for inter-Korean relations, the North Korean envoy said they are now at a "standstill, without

even advancing into the main phase of implementation." He said this is "attributable to the double-dealing behaviour of the South Korean authorities," which he described as appearing to offer peace initiatives while escalating military preparedness.

Acting IAEA Director General Cornel Feruta told the assembly that it has been more than 10 years since the agency's inspectors were ordered to leave North Korea, which is also known by its official name, the Democratic People's Republic of Korea. But he said "the agency continues to monitor the DPRK's nuclear program, including through satellite imagery." Feruta said North Korea's nuclear activities "remain a cause for serious concern" and clearly violate UN Security Council resolutions. He called on North Korea to comply with its UN obligations and "cooperate promptly" with the IAEA.

Source: <https://www.indiatoday.in/>, 12 November 2019.

## **PAKISTAN**

### **Pakistan Stepping Up Efforts to Illegally Procure Nuclear Technology, Says German Government**

According to the German government, Pakistan has heightened its efforts to illegally obtain advanced technology used in NBC, says a report published in the Hindustan Times. Many legislatures of the left party in German parliamentary group had raised a question regarding this. The answer the the same was communicated by the German government in an official reply earlier this month.

The response from the German government fits accurately to the concerns raised by the German Intelligence agency, Bundesamt für Verfassungsschutz (BfV) in 2018. The intelligence

agency had said that there had been a "steep increase" in Pakistan's attempts to secretly gain advanced nuclear technology in Germany and other Western countries. The report by the intelligence service also added that Pakistan which currently holds 130 to 140 nuclear warheads has plans to augment their nuclear arsenal to 250 atomic weapons by 2025.

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In addition to this, the report highlights the significant fact of Pakistan being a non-signatory to the NPT and associated security agreements. Along with this, the report underscores Pakistan's "extensive military nuclear and carrier technology programme directed against the 'arch-nemesis' India".

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Dagdelen and four other MPs of the Left Party had written to the German government seeking information on quantitative and qualitative changes since 2010 in attempts by foreign countries to illegally acquire goods required for the research and manufacture of CBRN weapons and carrier

systems from Germany, a country known for housing pioneer companies with unmatched expertise in the nuclear field. ... However, the report mentions that Pakistan has seen a sharp increase in proliferation-relevant procurement activities in recent years while adding "no quantitative change" was observed with regard to North Korea and Syria. ...

## **NUCLEAR DISARMAMENT**

### **GENERAL**

#### **Japan's Disarmament Resolution Adopted by UN**

The UN disarmament committee on November 1<sup>st</sup> 2019 adopted a Japan-submitted draft resolution

on nuclear disarmament. The draft calls for an action plan to help rid the world of nuclear weapons. The resolution lists six measures Japan says the international community must take immediately.

They call for increased transparency of policies of nuclear-armed powers to build mutual trust between countries. The resolution urges the promotion of educational programs such as interaction with atomic bomb survivors. It also proposes a framework to facilitate dialogue between nuclear-armed nations and others. Members of the committee approved the resolution by a majority, with 148 of 178 countries voting in favour. Four countries objected and 26 abstained. The United States abstained, saying the plan does not reflect the world's changing security environment.

Brazil also abstained on the grounds that the resolution should call for stronger commitments from nuclear-armed nations to disarm. Brazil supports the UN Treaty on the Prohibition of Nuclear Weapons; which Japan has not joined. The reactions reflect the difficulties Japan faces in serving as a bridge between different sides. Japan's disarmament ambassador Nobushige Takamizawa said the other nations understood Japan's stance of pursuing common ground between nuclear and non-nuclear armed nations, but that even more effort is needed.

Source: [https://www3.nhk.or.jp/nhkworld/en/news/20191102\\_16/](https://www3.nhk.or.jp/nhkworld/en/news/20191102_16/), 01 November 2019.

NUCLEAR SECURITY

RUSSIA

Reviving Political Momentum to Strengthen Global Nuclear Security

When senior government officials – presidents, prime ministers, or foreign ministers – believe something is important, things get done. Policies and priorities are developed, resources are marshalled, stakeholders are convened, and deliverables are expected. Action on nuclear security is no different, and over the course of six years, the series of Nuclear Security Summits achieved significant progress in reducing the risk of nuclear materials

getting into the hands of terrorists. But today, political attention on this topic has significantly diminished since the last Nuclear Security Summit in 2016. Given the threat of catastrophic nuclear terrorism facing the global community, there is a dire need to recapture political attention and momentum on nuclear security and collectively manage the long-term risks associated with the peaceful use of nuclear materials and technology.

**Legacy of the Nuclear Security Summits:**

Biennially between 2010 and 2016, more than 50 heads of government gathered to share their nation's progress on nuclear security and make commitments to future actions. These NSS—first

convened by President Obama—led to significant progress in nuclear security, with around a dozen countries completely eliminating their weapons-usable nuclear materials and many more updating their nuclear laws and regulations, committing to implement international nuclear security

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guidance, and agreeing on the need to build confidence through information sharing. Efforts also achieved entry into force of a major international treaty.

There is no doubt that the high-level attention brought by the Summits—and by the charismatic U.S. president who conceived of them—was a large reason for the significant progress on nuclear security during that period. After all, to generate action, especially momentous action, there is nothing like the public accountability and peer pressure of leaders having to meet their counterparts on the global stage.

Summit participants took steps at the 2016 Summit to sustain political attention and momentum and continue efforts to strengthen nuclear security through other international institutions and mechanisms like the International Atomic Energy Agency (IAEA). However, high-level political attention has waned. Not only have we seen evidence that progress and commitment to nuclear security has slowed, political obstacles prevent the IAEA from realizing its full potential as a central player in nuclear security. This is not to say that heads of government must meet at regular summits or that every meeting between leaders must have nuclear security as the first talking point, but it must be a priority for leaders, demonstrated through tangible and visible commitments and actions. Fortunately, there are opportunities to revive political momentum in the near future.

**2020 ICONS:** An important opportunity will come in February 2020, when the IAEA convenes its third International Conference on Nuclear Security (ICONs). ICONs kicks off with ministers or their designees offering national statements and issuing a ministerial declaration outlining general principles on nuclear security. Unfortunately, most countries have not sent ministers, itself a symptom of waning high-level attention. The remainder of ICONs consists of panels, presentations, and side events open to government officials, academics, and NGO representatives.

The ministerial segments and ministerial declarations—underwhelming at past ICONs—

could be brought to life, if countries would be willing to take a more ambitious, forward-leaning approach, including by sending ministers to attend the ministerial segment.

Ministers should offer up new commitments, perhaps joining with other ministers to push the envelope in areas such as minimizing highly enriched uranium, committing to implement IAEA nuclear security guidance, providing support for the IAEA's nuclear security mission, or highlighting the importance of information sharing. One possible vehicle for delivering commitments at ICONs is through signing INFCIRCs (IAEA information circulars) that originated as joint commitments at the Nuclear Security Summits and are now open to signature by all IAEA member states. Ministers should also use the ICONs platform to promote ways their country has made progress in nuclear security, perhaps highlighting recent achievements.

**The CPPNM/A RevCon:** The next major opportunity will come in 2021, when the IAEA will convene a review conference (RevCon) for the Amended CPPNM/A. The CPPNM/A is the only legally binding treaty requiring countries to protect nuclear materials and nuclear facilities and is therefore the foundational international instrument for nuclear security. At the RevCon, as I have recently argued, countries should prioritize actions to build a strong, effective, and sustainable treaty regime.

The 2021 RevCon—the single mandated review conference, required five years after the amended treaty's entry into force—should not be a pro forma meeting to check a box. Instead, countries should take a more ambitious approach and agree to hold future RevCons, with each successive RevCon selecting the next review conference date. The possibility of future RevCons is clearly envisioned by the text, and they will enable a more sustainable treaty regime that can evolve as threats, technology, and best practices evolve.

The RevCon also provides a unique opportunity for countries to engage in real, substantive dialogue on nuclear security—on lessons learned, best practices, and ideas for continuous

improvement. Countries can share their assessments of trends in nuclear security that will impact how they implement the treaty based on their own national or regional context.

As the preparatory process for the RevCon gets under way this year and next, some political heft is needed to drive the RevCon toward such an ambitious approach and avoid a wasted opportunity.

**Regional Fora:** Important opportunities for rebuilding political attention on nuclear security and overcoming barriers at the IAEA exist within regional fora. Different countries and regions hold a variety of perspectives about nuclear risks. Neighbouring countries often have existing trust relationships that can encourage more openness regarding sensitive topics. National and regional contexts are unique; a one-size-fits-all approach fails to acknowledge these differences. Countries focused on gaining the benefits of peaceful nuclear technology, whether to provide reliable energy, life-extending medical treatment, or opportunities for scientists, understandably want the IAEA to prioritize its technical cooperation and assistance. Countries focused on the threat of nuclear terrorism want to strengthen the IAEA's role in addressing this threat through its nuclear security activities.

These interests don't have to conflict and should be mutually reinforcing. An act of nuclear terrorism anywhere will have global consequences, including a negative impact on the public's perception—and acceptance—of peaceful use of nuclear material and technology. A greater understanding of this linkage—and the IAEA's important role in both technical cooperation and nuclear security—is needed at the political level. Regional fora, conferences, or high-level meetings among regional leaders, might enable more constructive opportunities to increase awareness about the importance of nuclear security and strengthen support for the IAEA's role.

**Looking Ahead:** It is vital that all countries work together to prevent an act of nuclear terrorism—an event that would impact us all. But political will is needed to take the actions necessary to strengthen nuclear security, strengthen global cooperation, and support the IAEA's role. Upcoming opportunities exist for regaining political attention, but governments need to seize them. Over the next two years, we will see which path they take.

Source: <https://www.europeanleadershipnetwork.org>, 28 October 2019.

## NUCLEAR SAFETY

### FRANCE

#### France Turns Off Nuclear Reactors Following Earthquake

Reactors at a nuclear plant in south-eastern France have been switched off to allow inspectors to carry out a safety audit, following 5.1 magnitude earthquake that injured four people. French state-controlled utility EDF has said reactors 2, 3 and 4 of its Cruas plant – located about 10 kilometres from the epicentre in Le Teil, Ardèche – would remain offline until 15 November.

A sensor at the plant was activated during the earthquake, which occurred some 30 kilometres from Tricastin – another nuclear power site that appears to have been unaffected. “The seismic vibration threshold triggered an alarm on only one of the five sensors present on the site,” said the region's prefect, Hugues Moutouh. “No damage to the buildings was found, and the facilities are functioning normally.” France's Nuclear Safety Agency ASN said “no visible damage” had been caused to any nuclear site but that EDF had yet to calculate the exact impact of the earthquake.

Source: <http://www.rfi.fr/>, 11 November 2019.

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**USA**

**US Nuclear Reactor Shut Down after Officials Discover Leak**

A South Carolina energy company has shut down one of its nuclear reactors after officials discovered a small leak in the coolant system. Dominion Energy spokeswoman Rhonda O'Banion told The State that the V.C. Summer reactor in Fairfield County is temporarily out of commission as the water leak, possibly from a valve, is addressed. The company says the liquid has not escaped beyond the reactor's containment building, and there's no danger to the public. Dominion spokesman Ken Holt said the company notified the Nuclear Regulatory Commission, but wasn't required to make any other public notice. He said the plant went offline.

Source: <https://www.foxbusiness.com/>, 11 November 2019.

**NUCLEAR WASTE MANAGEMENT**

**USA**

**US Won't Clean Up Marshall Islands Nuclear Waste Dome but Wants it Free of Anti-US Graffiti**

For years, American authorities have asserted they hold no responsibility for Runit Dome, a concrete-capped waste site in the Marshall Islands, where the United States dumped 35 Olympic swimming pools' worth of atomic soil and debris created by its Cold War nuclear weapons testing program.

But sometime during the spring of 2018, unknown vandals spray-painted graffiti across its face: "Nuclear Waste. Property of USA Government. Please Return to Sender" and "Nuclear Waste. Property of the USA. Please Return to Sender." That grabbed the attention of the U.S. government and its contractors.

Despite its position that the dome and its radioactive contents belong to the Marshallese government, the U.S. Department of Energy paid

a contractor to scrub off the offending message after getting permission from the mayor of Enewetak Atoll, where the dome is located. The "graffiti on the dome was removed by Lawrence Livermore National Laboratory, a US DOE contractor," the mayor, Jack Ading, said in an email to *The Times*.

**Despite its position that the dome and its radioactive contents belong to the Marshallese government, the U.S. Department of Energy paid a contractor to scrub off the offending message after getting permission from the mayor of Enewetak Atoll, where the dome is located.**

Ading said he probably should have rejected the request to remove it — made by Terry Hamilton, a contractor for the Lawrence Livermore National Laboratory — because the message on the dome reflected Marshallese sentiment that the United States

should take ownership of its radioactive waste. But he decided to go along to avoid conflict. "I did not want to fight with USG over a graffiti," he said, referring to the U.S. government.

In a special report, *The Times* documented how Runit Dome is threatened by sea level rise and could eventually spill its radioactive contents into the ocean around Enewetak. While the United States has repeatedly declared it bears no obligation to fortify the structure or take ownership of the waste, the graffiti cleanup reveals it is attentive to keeping the dome free of anti-U.S. slogans. Some find it ironic that the Energy Department and its contractors are keeping the surface of the dome clean, while doing nothing to prevent the radioactive waste from leaking out of it. "When there are limited resources, it is disheartening that graffiti removal would take priority over other basic services and requests," said Holly Barker, an anthropologist at the University of Washington in Seattle.

From 1946 to 1958, the United States detonated 67 nuclear bombs in the Marshall Islands. Forty-three of those tests were conducted in Enewetak lagoon. It also conducted biological weapons testing in the atoll and shipped in 130 tons of soil from an atomic testing ground in Nevada for experiments. During the late 1970s, as the United States was returning control of Enewetak to the Marshallese, the U.S. government initiated a cleanup of the atoll — to remove the most lethal and irradiated land-based soil and debris. It

dumped that waste in a 350-foot-wide unlined nuclear bomb crater pit on Runit Island, and then covered it with an 18-inch-thick concrete cap.

The dome, which resembles an old, weathered Houston Astrodome and can be seen from miles away, is reportedly leaking plutonium-laced groundwater into the Enewetak lagoon and Pacific Ocean. Journalist Mika Makelainen was at the dome on May 25, 2018, soon after the vandalism took place. "The graffiti looked fairly new, and none of the Marshallese guys had seen it before," said Makelainen, who works for the Finnish broadcast news service Yle. He said it was rumored that "a very large sailing boat had visited Runit" before his arrival, and it was believed by the Marshallese that people on that boat could have been responsible.

During an interview last fall, at his Livermore laboratory, Hamilton said he learned about the graffiti incident after being informed by Enewetak officials, whom he described as displeased by the vandalism, contrary to Ading's account. Hamilton

said he sent out one of the Energy Department technicians living on Enewetak to clean up the graffiti. "They helped wash some of that off," he

said, adding that he thought the graffiti was still visible from a drone's eye view. "It's not obvious when you are walking around."

A *Times* reporting team did not see the graffiti when it visited in August 2018, and no sign of it is visible in The Times' drone video or photographs.

A spokeswoman for Lawrence Livermore did not respond to recent inquiries about the graffiti, or the cost of the cleanup. The U.S. government has provided the Marshallese with about \$30 million a year since 2003. In 2023, a so-called compact of free association signed by the two countries, which governs the

relationship between them, is set to expire. This summer, U.S. Secretary of State Michael R. Pompeo announced that the United States intends to extend the compact. Negotiations are just beginning.

*Source: Susanne Rust, <https://www.latimes.com>, 14 November 2019.*

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