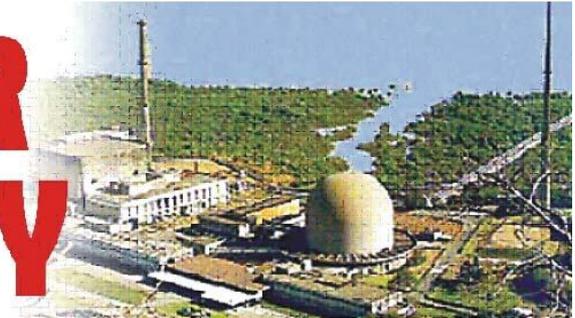


# NUCLEAR SECURITY



A FORTNIGHTLY NEWSLETTER ON NUCLEAR DEFENCE, ENERGY AND PROLIFERATION FROM  
CENTRE FOR AIR POWER STUDIES

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## OPINION – Philip Campose

### The Saliency of Pakistan's Nuclear Weapons

Pakistan is reported to have the fastest growing nuclear weapon arsenal in the world. The arsenal is also seen by many military planners in Pakistan as a low cost option to make up for lack of conventional symmetry vis-à-vis India. But for a small and unstable, terrorist-infested country which is economically weak, its ever increasing capacity, quantities, range and diverseness of nuclear weaponry and delivery means have startling portents, and are a matter of grave concern for the global community.

Just a few days back, the United States' Director Defence Intelligence Agency, Vincent Stewart told the US Senate Armed Services' Committee that, "Pakistan's growing nuclear arsenal and its evolving tactical nuclear weapons doctrine pose increasing risk of an incident or accident". So, why exactly does Pakistan need all these nuclear weapons? And, who is paying for them, and why? These are questions which the international community would need to analyse correctly to predict the related future course of events affecting regional and global security.

Pakistan's nuclear weapons program had its origins in Foreign Minister ZA Bhutto's famous

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statement following the India-Pakistan war of 1965, "If India builds the bomb, we will eat grass and leaves for a thousand years, even go hungry, but we will get one of our own". Subsequently,

in early 1972, in the aftermath of the defeat in the India-Pakistan war of the previous year, Prime Minister ZA Bhutto directed Pakistan's scientific community to build a nuclear bomb within three years.

The job was initially given to the country's Atomic Energy Commission (PAEC), which had been set up in 1956 'to develop nuclear energy for peaceful purposes'. As part of this program, uranium was being mined from the Dera Ghazi Khan district. Pakistan's first nuclear

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reactor had been commissioned in 1965. The US and Canada had a major role in training Pakistani nuclear engineers and providing nuclear knowhow to the PAEC for construction and upgradation of reactors for civilian purposes.

The IAEA had funded the building of a subsequent larger nuclear reactor, under IAEA safeguards. Surprisingly, starting 1969, France's CEA and UK-based BFNL signed a contract for supplying knowhow and parts for construction of a nuclear plant, which could also have been used for reprocessing weapons grade plutonium in small quantities annually, but reportedly cancelled the projects with PAEC in 1974.

However, much of the technology and material for developing the weapons and associated delivery systems was acquired from its all weather friend in the P5 and even from its rogue associates at various points of time, in breach of international conventions. The steely determination to acquire the weapons, combined with a 'beg, borrow or steal' approach, helped along by P5

acquiescence, resulted in Pakistan developing, by 1978, the requisite centrifuge technology at KRL at Kahuta and being capable of moderate enrichment of uranium for the production of fissile material.

AQ Khan, reportedly with state blessings, also ran an atomic proliferation network from Pakistan to various countries, especially North Korea, which he reportedly visited thirteen times during this period. Concurrently, Pakistan did not forego the plutonium route, and under PAEC and its Chairman Munir Ahmad Khan, who was AQ Khan's rival, succeeded with this route too by the early 1980s.

Ostensibly, Pakistan's nuclear weapons, when first developed, were meant to counter India's superior combat power, in the context of being militarily weaker. However, by 1984, when Pakistan developed its nuclear weapon capability, using HEU as fissile material, produced under AQ Khan's supervision at KRL, it provided President Zia-ul-Haq with an opportunity to muddy the waters in

the Indian state of Jammu & Kashmir by launching 'Operation Tupac' in 1988, to trigger and support insurgency in Kashmir using the state policy of "applying a thousand cuts to India through the instrument of terror".

Accordingly, post Soviet withdrawal from Afghanistan in 1989, Pakistan reoriented the infrastructure created for recruitment and training of the Afghan/ Islamist Mujahideen during the Soviet occupation, for this purpose. As part of this insidious plan, which continued even after Benazir Bhutto, Nawaz Sharif and General Pervez Musharraf came to/took over power, the nuclear weapons were now also meant to provide cover for the terror attacks into Kashmir and the Indian hinterland.

This became apparent during the Kargil intrusions of 1999 and the numerous terror attacks unleashed on Kashmir and other parts of J&K thereafter, even spreading the 'arc of terror' to other parts of the country. Manifestations of these were the communal massacres of non-Muslim

civilians in J&K in 2000, the cross-border terror attacks on the J&K State Legislature and Indian Parliament in 2001, the attacks on Raghunath temple, Kasimnagar and Kaluchak cantonment in Jammu and also the Akshardham temple, Gujarat in 2002, the Sanjuwan and Tanda army camp attacks and the Shopian Kashmiri Pandit massacre of 2003, the Jammu Railway Station attack of 2004, all these terror attacks actively abetted by the Pakistani Army, through its ISI. Concurrently, nuclear 'sabre-rattling', aimed at India and the wider global community, was honed to a fine art by the Pakistani government and military, to dissuade the Indian government and Army from launching a punitive conventional response to its continuing state sponsored terror attacks.

In the meanwhile, the Indian Army had realized, after its year-long mobilization (Operation Parakram), which it had undertaken throughout 2002 in response to the Parliament attack of December 2001, that there was a need for a more

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robust and pro-active response to manifestations of the Pakistani policy of terror. Hence, in what can be considered a brilliant strategic move, the Indian Army leadership developed a new pro-active doctrine, colloquially called the 'Cold Start Doctrine', to let the Pakistani Army know what was in store in case the terror attacks continued. Since 2004, this Doctrine has been honed to perfection, notwithstanding the Pakistani nuclear coercion.

The Indian nuclear doctrine, in its present robust form, fully supports the Cold Start

Doctrine. The Pakistani Army tested the waters by launching the Mumbai terror attack of December 2008 and knows how close it was to getting hit by the 'Cold Start Doctrine', in its aftermath.

The Pakistani Army, in 2011, responded to the Doctrine by launching the Nasr (Hatf IX) short range missile and making claims to have developed TNWs to stymie India's 'Cold Start Doctrine'. Subsequently, once the Hatf IX and TNWs officially entered service two years later, Pakistan recommenced cross-border terror attacks into the Indian hinterland, beyond Kashmir, with the ISI-controlled LeT attack on Hiranagar police station and a military unit in Samba in September 2013. Since then, there have been similar attacks by LeT/JeM modules at Janglote, Arnia and Rajbagh in the Jammu region, and more recently, at Dinanagar and Pathankot in Punjab, under the cover of the TNWs. But with patience in India running thin, it is a moot point whether this cover will work for long. The development of TNWs could well end up in the nature of Pakistan having "cut its nose to spite its face". And such an assessment is not only related to what India may do in response to continued terror attacks but what may happen in Pakistan itself as a result of the

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"incidents and accidents" that the US Director DIA spoke about.

Pakistan's fast growing nuclear arsenal serves the purpose of others too, as evident from the source of its technologies, material and funds, and the extent to which Pakistan may go to satisfy its benefactors or return favours is yet to be fully discerned. But more importantly, the more weapons it makes, the more the possibility that its 'non-state actors' like TTP would step up efforts to lay their hands on them. Thus, beyond a point, it comes under 'the law of

diminishing returns' – the production of nuclear weapons becomes a self-defeating game. And it needs no guesses to judge as to whom the "incidents or accidents" is likely to affect the most. Pakistan may then have to pay a very high cost for its 'low cost option'.

Source: <http://www.indiandefencereview.com/>, 04 March 2016.

#### **OPINION – Doug Bandow**

##### **Should Seoul Go Nuclear?**

Four decades ago South Korea's President Park Chung-hee, father of the current president, launched a quest for nuclear weapons. Washington, the South's military protector, applied substantial pressure to kill the program. Today it looks like Park might have been right. North Korea continues its relentless quest for nuclear weapons and long-range missiles. The South is attempting to find an effective response.

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South Korea closed Kaesong industrial complex, which provided the North with nearly \$100 million in hard currency annually. Seoul also is talking with the United States about installing the Terminal High Altitude Area Defense, or THAAD system. Neither

of these steps is likely to much affect Pyongyang's behavior.

Although the North is unlikely to attack since it would lose a full-scale war, South Korea remains uncomfortably dependent on America. And Washington's commitment to the populous and prosperous South likely will decline as America's finances worsen and challenges elsewhere multiply.

In response, there is talk of reviving the South's nuclear option. Won Yoo-cheol, parliamentary floor leader of the ruling Saenuri Party, told the National Assembly: "We cannot borrow an umbrella from a neighbor every time it rains. We need to have a raincoat and wear it ourselves."

Chung Moon-jong - member of the National Assembly, presidential candidate, and founder of The Asan Institute for Policy Studies - made a similar plea two years ago. He told an American audience "if North Korea keeps insisting on staying nuclear then it must know that we will have no choice but to go nuclear." He suggested that the South withdraw from the NPT and "match North Korea's nuclear progress step-by step while committing to stop if North Korea stops."

The public seems receptive. Koreans' confidence in America's willingness to use nuclear weapons in defense of the South has declined, while support for a South Korean nuclear program is on the upswing, hitting 66 percent in 2013. While President Park Geun-hye's government remains formally committed to the NPT, Seoul has conducted nuclear experiments and resisted oversight by the IAEA. Of course, the idea triggers a horrified reaction in Washington and among those committed to nonproliferation.

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and maybe Taipei and Canberra as well, depending on how far Washington extends the "nuclear umbrella."

While America's overwhelming nuclear arsenal should deter anyone else from using nukes, conflicts do not always evolve rationally. South Korea and Japan are important international partners, but their protection is not worth creating an unnecessary existential threat to the American homeland. Better to create a balance of power in which the US is not a target if nukes start falling. And that would be achieved by independent South Korean and Japanese nuclear deterrents. Such a prospect would antagonize China. But then, such

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an arsenal would deter China as well as North Korea. Which also would serve American interests. Moreover, the mere threat might end up solving the problem. That is, when faced with the prospect of Japanese and South Korean nuclear weapons, China might come to see the wisdom of applying greater pressure on the North — most importantly, cutting off energy and food shipments.

The US-South Korea discussions over THAAD may have encouraged Beijing to indicate its willingness support a UN resolution imposing more pain on the North Korea for its latest nuclear launch... .

Abandoning nonproliferation is not a decision to

take lightly. No one wants a nuclear arms race. But China already is improving its nuclear forces to diminish Washington's edge. And allowing North Korea to enjoy a unilateral advantage creates great dangers.

So policymakers should consider the possibility of a nuclear South Korea. The NPT does not necessarily triumph over other security concerns. Keeping America entangled in the Korean imbroglio as Pyongyang develops nuclear weapons is a bad option which could turn catastrophic. Blessing allied development of nuclear weapons might prove to be a better alternative. Park Chung-hee was a brute, but his desire for a South Korean nuclear weapon looks prescient. Maybe it's time for the good guys in Northeast Asia to be armed as well.

Source: <http://www.japantimes.co.jp/opinion/>, 08 March 2016.

## **NUCLEAR STRATEGY**

### **DPRK**

#### **North Korea has Miniaturized Nuclear Warheads: Kim Jong-un**

North Korean leader Kim Jong-un said the country has miniaturized nuclear warheads to be mounted on ballistic missiles, the North's KCNA news agency reported on 9<sup>th</sup> March. "The nuclear warheads have been standardized to be fit for ballistic missiles by miniaturizing them," KCNA quoted him as saying as he inspected the work of nuclear workers, adding "this can be called true nuclear deterrent." The comments were Kim's first direct mention of the claim previously made repeatedly in the country's state media to have successfully miniaturized a nuclear warhead to be mounted on a ballistic missile, which is widely questioned. Kim also inspected the nuclear warheads designed for thermo-nuclear reaction, KCNA said, referring to a hydrogen bomb that the country claimed to have tested in January. ...

Source: <http://timesofindia.indiatimes.com/>, 09

March 2016.

### **INDIA**

#### **India Test Fires Nuke Capable SLBM K-4**

India has reportedly conducted a test of its home grown intermediate range Submarine Launched Ballistic Missile (SLBM) K-4 secretly from an undersea platform in the Bay of Bengal in a bid to boost its deterrence capability by strengthening the second strike fire power.

Even as the authorities of DRDO are tightlipped about the secret test, a reliable defence source on 8<sup>th</sup> March confirmed 'The Express' that this nuclear capable missile was fired

**This maneuverable missile having an innovative system of interlacing in three dimensions can also cruise at a hypersonic speed. This exceptional feature of the weapon system makes it difficult to be tracked easily and destroyed by any anti-ballistic missile defence systems. The missile has a high accuracy of close to zero CEP.**

from a submerged pontoon positioned nearly 30 feet deep sea offshore Vizag coast on 7 March. Launched underwater, the missile developed indigenously by the DRDO, surged to the surface leaving behind a ribbon of thick smokes. Although the result of the test was not known, the source claimed it's take off was smooth as a powerful gas generator successfully ejected it from the pontoon.

The first test of the missile was also conducted secretly on March 24, 2014 and the DRDO admitted it officially only in January last year in the Aero-India show. The K-4 missile is best in the world in its class and it is faster and stealthier. Once operational, the two-stage missile will equip the country's first nuclear-powered submarine INS Arihant.

A defence scientist said the K-4 missile will supplement its cousin 750-km range K-15 missile (renamed as B-05). Nuclear powered INS Arihant submarine which is likely to be commissioned in the Navy shortly will be equipped with four K-4 missiles or 12 K-15 missiles. The missile has to go for three/four more trials before being inducted in the navy.

This maneuverable missile having an innovative system of interlacing in three dimensions can also cruise at a hypersonic speed. This exceptional feature of the weapon system makes it difficult to be tracked easily and destroyed by any anti-

ballistic missile defence systems. The missile has a high accuracy of close to zero CEP.

The underwater launched ballistic missile is about 12 metres long with a diameter of 1.3 metres. It weighs around 17 tonnes and is capable of delivering two tonne warhead up to a distance of over 3,500 km. The missile is powered by solid rocket propellant. High power long range tracking systems were spread along its trajectory to track the flight path.

Source: <http://www.newindianexpress.com/>, 09 March 2016.

## NATO

### Nuke Chief: Time is Now to Begin Updating Nuclear Weapons

In describing how little room the Pentagon has to extend the life of its decades-old nuclear forces, the top US nuclear war-fighting commander, Navy Adm. Cecil Haney, says "we're at the brick wall stage." Time to begin modernizing the country's nuclear weapons is running short, he and other Pentagon leaders say. They contend the force is still in fighting shape - "safe, reliable and effective" is the official mantra. But they also argue the time has come to begin modernizing the force or risk eroding its credibility as a deterrent to attack by others.

They don't face brick wall-like resistance in Congress, but the debate over spending hundreds of billions of dollars to build and field a new generation of nuclear-capable bombers, submarines and land-based missiles is just beginning. Critics say full-scale modernization is neither affordable nor necessary. The debate is influenced not only by the perceived need to fully replace aging weapons but also by worries about North Korea's nuclear

ambitions and concern over what Defense Secretary Ash Carter calls Russia's "nuclear sabre-rattling."

Robert Work, the deputy secretary of defense, said the Pentagon will need an estimated \$18 billion a year between 2021 and 2035 to modernize the three "legs" of the US nuclear triad — weapons capable of being launched from land, sea and air. "We need to replace these," Work said. "We can't delay this anymore."

The enormous sums needed are at risk of getting squeezed by high-priority requirements for non-nuclear, conventional weapons. And Work's numbers don't include the billions that would be needed to modernize the nuclear warheads on the business end of missiles and bombs.

"Modernization now is not an option" - it must happen, Haney, the commander of US Strategic Command, said in an interview on 26 February, just hours after watching a test launch of an unarmed Minuteman 3 intercontinental ballistic missile, or ICBM. The Minuteman, which has been on constant 24-hour alert since 1970, has long surpassed its 10-year life expectancy.

Haney said the US stockpile of nuclear warheads is the oldest it has ever been. As head of the Strategic Command, he is the military's top nuclear war-fighter. "We have to realize we can't extend things forever," Haney said, noting that the Navy is planning to replace its aging Ohio-class ballistic nuclear missile submarines, while the Air Force intends to build a new nuclear-capable bomber to replace the B-52. Work said that although the Pentagon is closely monitoring Russia's nuclear modernization, which includes development of new versions of its ICBMs, those moves are not driving US decisions about how quickly and broadly it should modernize its nuclear forces. ...

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Source: <http://www.hollandsentinel.com>, 29 February 2016.

## **RUSSIA**

### **Russian Nuclear Submarine to Launch Bulava ICBMs to Far East Range in June**

The Borei-class strategic nuclear submarine Vladimir Monomakh will perform a multiple launch of two Bulava intercontinental ballistic missiles towards the Kura practice range in Kamchatka in June, a source in the defense and industrial sector told TASS on 11 March.

"It is planned that the Vladimir Monomakh will fire two Bulava ICBMs at the beginning of summer, approximately in June, from a submerged position in the White Sea towards the Kura practice range in Kamchatka," the source said. A source earlier told TASS that Russia's Northern Fleet planned to perform a multiple launch of Bulava ICBMs in 2016 but didn't specify the time of the firing exercise or the name of the submarine for the Bulava launch. A multiple launch of two Bulava intercontinental ballistic missiles was last performed by the nuclear-powered submarine Vladimir Monomakh on November 14, 2015.

The Russian Defense Ministry said at the time that "the reentry vehicles have successfully reached the Kura training range in Kamchatka." A source in the defense industry confirmed that the nuclear submarine Vladimir Monomakh armed with 16 Bulava missiles would perform its inter-sea passage to the Pacific Fleet in August-September to join the same-series Alexander Nevsky underwater cruiser, which had arrived in Kamchatka in 2015. According to the source, the submarine Vladimir Monomakh will receive a full weapons suite, only if the Bulava multiple launch is successful.

The Vladimir Monomakh is the third Project 955

Borei-class submarine. It was laid down in 2006 and transferred to the Navy in late 2014. Borei-class submarines armed with Bulava missiles are expected to make up the mainstay of Russia's naval strategic nuclear forces in the coming decades. Overall, Russia plans to build eight Borei-class submarines, including five undersea missile cruisers under the improved Project 955A.

Source: <http://tass.ru/en/>, 11 March 2015.

## **UK**

### **UK to Spend \$900 Million More on Nuclear Sub Program**

The British government is set to spend an additional \$905 million on its nuclear submarine program. The funding, announced by Defense Secretary Michael Fallon, will help pay for new parts and facilities as well as design work for the Royal Navy submarines that will replace four Vanguard-class submarines built between 1986 and 1999.

"Our nuclear deterrent provides the ultimate guarantee of our security and our way of life," Fallon said. "That's why we are getting on with this

investment. This money will support further design work, new infrastructure and the purchase of key parts such as engines and gearboxes, as well as jobs across the UK"

About \$317 million of the new funding will be for new facilities at BAE Systems at Barrow-in-Furness, England, where the submarines will be assembled. There will also be a significant investment in the UK/US collaboration for the Common Missile Compartment and purchase of key long lead items for the submarines. The new investment will take the total cost of the assessment phase of the Successor program to nearly \$5.5 billion.

Source: [http://www.upi.com/Business\\_News](http://www.upi.com/Business_News), 04 March 2016.

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**BALLISTIC MISSILE DEFENSE**

**SOUTH KOREA**

**Talks on US Missile Shield Test Ties between Beijing and Seoul**

When South Korea's president joined her Chinese counterpart at a military parade in Beijing in September the event was seen as one of her biggest achievements. Park Geun-hye had presided over a steady strengthening of ties with China, South Korea's dominant trading partner, even at the risk of upsetting the US, which guarantees her country's security with its nuclear umbrella and 28,500 troops on the ground. But the relationship has been cast into doubt by South Korea's decision to discuss hosting a US-made missile defence system. China's ambassador to Seoul warned that the bilateral relationship could be "destroyed in an instant" if a deployment went ahead.

Seoul hit back at China's pressure, summoning the ambassador to protest at his outburst. Ms Park's office pointedly remarked that China "had better recognise" that Seoul would make the missile shield decision in line with its own national security interests.

The tensions mark an abrupt departure from years of strengthening in the bilateral relationship. Ms Park made a state visit to China four months after taking office in 2013, and a year later Mr Xi became the first Chinese leader to visit South Korea before the North. South Korea has aggressively promoted a local renminbi market and signed a trade agreement with Beijing last year, soon after agreeing to join the Chinese-led Asian Infrastructure Investment Bank.

One of the key motivations for Seoul's charm offensive was the hope it could influence Beijing's policy towards Pyongyang, which is overwhelmingly reliant on China for its mineral exports and oil imports.

... Yet after two years of relatively cool treatment

of Pyongyang, China last year adopted a friendlier stance, which failed to dissuade North Korea from carrying out a nuclear bomb test in January, followed by a satellite launch last month. That event, which used ballistic missile technology, prompted Seoul to alter its hitherto coy position on the US-made Terminal High-Altitude Air Defence system, declaring it would enter talks with Washington on a deployment that the US had long quietly promoted.

Both parties maintained the system was simply a means of protecting South Korean citizens and US soldiers from a North Korean nuclear strike. However, China has long voiced concerns that the system could affect its national security. The system's radar would cover much of north-east China, where ballistic missiles aimed at the US mainland must be based to be within range, says Zhao Tong, an analyst at Beijing's Carnegie Tsinghua Center. ...

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While the souring in relations seems "reparable", it demonstrates the limits to any security partnership with China, says Bong Young-shik, an analyst at the Asan Center for Policy Studies in Seoul. "The key security asset is the US alliance." But the missile defence announcement could be seen as part of a successful policy on managing China, he adds, if it helped shock Beijing into endorsing tougher action against North Korea. Having initially argued for dialogue over sanctions, Beijing agreed with the US on an unusually tough set of UN Security Council measures, including restrictions on Pyongyang's seaborne trade and mineral exports.

That agreement came three days after Seoul and Washington postponed the start of talks on the system, while senior US officials stressed it would not necessarily be deployed. The timing of these developments has prompted speculation in South Korea of a quid pro quo between China and the US — causing discomfort for some in a country that has repeatedly been caught in the middle of contests between great powers. ...

Source: <http://www.ft.com/>, 02 March 2016.

**NUCLEAR ENERGY**

**CHINA**

**China Plans 30 Overseas Nuclear Plants by 2030**

China aims to build 30 nuclear power units in countries involved with its Silk Road Initiative by 2030 as it looks to cash in its new 1000 mw nuclear reactor technology being built in Pakistan. The China National Nuclear Corp (CNNC) has reached bilateral agreements on nuclear energy cooperation with countries including Argentina, Brazil, Egypt, Britain, France and Jordan, its president Sun Qin said on 1 March. China is building two 1000 MW nuclear power plants in Pakistan's port city of Karachi at a cost of \$ 6.5 billion. ...

Source: [http://times of india.india times. com/](http://timesofindia.indiatimes.com/), 01 March 2016.

**FRANCE**

**France Prepared to Extend Life of Nuclear Reactors: Energy Minister**

The French government is willing to support a 10-year extension to the life of the country's nuclear reactors, operated by utility EDF, Energy Minister Segolene Royal told France 3 television on 28 February, 2016.

... Asked if she was ready to raise the limit on existing reactors to 50 years from 40 years, Royal said: "Yes, I am ready to give this the green light, depending obviously on the opinion of the Nuclear Safety Authority (ASN) .... the French people have for years invested a lot in the nuclear reactors." The ASN watchdog has the power to halt nuclear installations at any time if it sees a risk and is the only authority which can allow an extension to the life of the reactors beyond 40 years. State-owned EDF operates 58 nuclear reactors in France.

Source: <http://www.reuters.com/>, 29 February 2016.

**INDIA**

**Centre Plans to Set Up More Nuclear Power Plants**

On 2 March, Union Minister Jitendra Singh informed the Lok Sabha that to meet the country's growing needs, the government plans to set up nuclear power plants in Bihar, Haryana and Punjab. He also stated that the government aims to increase nuclear power generation capacity by three times in ten years. If it is 4,780 MW on today,

the same would go up to 13,480 MW. He said new places are being explored for setting up plants to generate nuclear power, which would be a big source for meeting the growing energy needs. With regard to nuclear power programme, Singh, the minister of state in the Prime Minister's Office, said the government is considering setting up new plants in areas not covered before. He said that a site has been identified for a nuclear power plant in Razauli in Bihar's Nawada district....

**The government's move to prepare a comprehensive plan for next 15-20 years will also give a much needed push for putting the implementation of nuclear capacity addition of 16,100 Mw on fast track. As on date, the installed nuclear power capacity in the country comprises twenty one reactors with a total capacity of 5780 Mw. Out of these twenty one reactors, one reactor Rajasthan Atomic Power Station-1 (RAPS) (100 Mw) is under extended shutdown for techno-economic assessment on continuation of its operation. The remaining twenty reactors with a capacity of 5680 Mw are presently operating.**

Source: <http://timesofindia.indiatimes.com/>, 02 March 2016.

**Nuclear Capacity of 16,100 MW to be Put on Fast-track**

The finance minister Arun Jaitley's proposal to allocate Rs 3000 crore for the nuclear power generation will help the state run NPCIL to raise debt of Rs 10,000 crore. Besides, it will also help further mobilize money from its joint venture companies involving NTPC, Indian Oil Corporation and National Aluminium. The government's move to prepare a comprehensive plan for next 15-20 years will also give a much needed push for putting the implementation of nuclear capacity addition of 16,100 Mw on fast track.

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NPCIL's former CMD SK Jain told Business Standard, "It is really heartening to see that a definite time bound action being proposed for augmentation of nuclear power capacity. The opportunity was already made available post 123 agreement. All the necessary spadework at many sties including land studies, impact assessment, land acquisition have already been done. Therefore, with the government's decision to provide Rs 3,000 crore, the actual progamme can be quickly launched." This apart, he informed NPCIL will be able to raise Rs 10,000 crore as debt on 70:30 debt equity ratio and equity from join venture companies will also start flowing.

Of the 16,100 Mw capacity, NPCIL has received crucial environment clearance for Kudankulam units 3&4 (2x1000 Mw) in Tamil Nadu while environment clearance for Gorakhpur plant (2x700) in Harayana has been obtained subject to clearance from wildlife angle. Further, NPCIL has obtained coastal zone regulation (CRZ) clearance and environment clearance for two units of 1,650 Mw for Jaitapur project in Maharashtra in 2010. NPCIL has submitted application in April 2015 to ministry of environment and forests (MoEF) for extension of validity of the clearance beyond five years. Further, the state undertaking has completed environment impact assessment (EIA) for 2x700 Mw Chutka plant in Madhya Pradesh and the report has been submitted to MoEF. It has received CRZ clearance and in principle forest clearance for the 2x1100 Mw Chhaya Mithi Virdi project in Gujarat. NPCIL is pursuing environment clearance from MoEF.

NPCIL has completed environment impact assessment (EIA) studies for 2x1500 Mw each in Kovvada in Andhra Pradesh and Mahi Banswara,

Rajasthan respectively. Moreover, the company has submitted term of reference document for EIA studies for 2x700 Mw Kaiga project in Karnataka. Department of Atomic Energy has recently told the parliament that these projects, which are being developed based on indigenous reactors and those supplied by foreign companies, are expected to be completed in about six to seven years from the start of their construction.

Source: <http://business-standard.com/>, 02 March 2016.

### **China Helped Pakistan Block India's NSG Membership Bid: Aziz**

Pakistan Prime Minister's Advisor on Foreign Affairs Sartaj Aziz on 8 March said that China had helped Pakistan in blocking India's bid to become a member of the NSG. India has been seeking membership to the 48-member club, whose members can trade in and export nuclear technology. While countries like the US have backed India's membership in the NSG, China has only offered conditional support to New Delhi. China's Foreign Ministry had called for "prudence and caution" over expanding the NSG.

When asked if China wants to back any other country's entry into NSG, Chinese Foreign Ministry Spokesperson Hua Chunying had said, "As for the expansion of the group, the members should make the decision on consensus after thorough discussions. India's inclusion into this group is an internal matter of the group. It needs prudence and caution and thorough discussions among all members." She also mentioned that "We support such discussion and we also support India's inclusion into this group if it meets all the requirements." Pakistan says if it is deprived of the NSG membership while India is accommodated, it would be taken as discrimination and lead to imbalance in the region.

Source: <http://www.thehindu.com/>, 09 March 2016.

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**JAPAN**

**Japan Restarts Fourth Atomic Reactor since 2012 Moratorium**

Kansai Electric Power Co.'s Takahama No. 4 reactor in Fukui Prefecture on 26 February became the nation's fourth to be restarted since 2012 and the first to burn MOX, a mixed-oxide fuel that contains plutonium.

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In a statement released on 26 February afternoon, Kepco President Makoto Yagi said safety would remain the top priority and that the utility would continue to promote safety standards beyond what was legally required. The startup came nearly a week after a radioactive water leak was discovered at the reactor's auxiliary building on 20 February. Kepco halted restart preparations while it repaired the leak, saying it did not pose a danger to the environment. The utility said the leak was caused by a loose pipe valve and could be repaired without affecting the restart schedule, which called for rebooting the unit by the end of this month.

Under Kepco's schedule for the restart process, the No. 4 reactor is expected to start generating electricity by 29<sup>th</sup> February afternoon and reach full power a few days later. Once the Nuclear Regulation Authority gives final approval, and assuming there are no last-minute technical problems, the plan is to have it back online and selling electricity from late March.

The restart of Takahama No. 4 comes about a month after the nuclear power plant's No. 3 reactor was restarted. Along with two reactors at Kyushu Electric's Sendai plant, which went back online last August, they comprise the four reactors that have been restarted since beefed-up nuclear safety standards took effect in 2012.

In addition to No. 3 and No. 4, which are at least 30 years old, Kepco also wants to restart Takahama Nos. 1 and 2, both of which are over 40. It hopes to run them for up to two decades.

Despite concerns about the increased probability of accidents at the aged plants, their restart moved a step closer to reality on 23 February, when the NRA said additional safety systems Kepco installed to extend the reactors' life spans met its standards.

The next step will be soliciting public comment, and then further permission from the NRA is required for what would be the first-ever extensions in Japan of reactors over 40 years old.

Before that happens, Kepco will seek final permission from the mayor of Takahama and the governor of Fukui Prefecture for the restart, which could be a lengthy process. The utility may also find itself forced to deal with public and political concerns in surrounding Kansai prefectures like Shiga and Kyoto, where safety concerns about the aged reactors are strong.

*Source: <http://www.japantimes.co.jp/>, 26 February 2016.*

**RUSSIA**

**Russia's New Nuclear Engine to Enable Spacecrafts to Reach Mars in 45 Days**

**A nuclear engine currently being developed in Russia by the nuclear agency Rosatom and the Russian Federal Space Agency (Roscosmos) will allow a spaceship to reach Mars in an unprecedentedly short period of just 1.5 months, Rosatom's General Director Sergei Kirienko said on 2 March.**

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Sergei Kirienko said on 2 March.

According to Kirienko, using existing technology, a spacecraft takes around 18 months to reach

Mars and it has no way of returning back to Earth or to maneuver while en route. "Installing a nuclear engine will allow [a spacecraft] to fly to Mars in a month and a half and to come back, as the spacecraft would retain the ability to maneuver," Kirienko said, addressing the Federation Council.

Moscow is a world leader in the sphere of atomic energy. At the moment, Rosatom, which incorporates many enterprises and nuclear institutions, is constructing 41 nuclear reactors, of which 34 are abroad.

Source: <http://sputniknews.com/>, 02 March 2016.

## **SOUTH AFRICA**

### **Nuclear Power is South Africa's Energy Solution**

During his State of the Nation Address, President Zuma said South Africa's nuclear-build programme would roll out at a pace the country can afford and that the plan was to introduce 9 600 MW of nuclear energy in the next decade.

Dr. Antonie Cilliers, who is from the North West University's School of Mechanical and Nuclear Engineering, says that "the government has been conducting a number of studies on the affordability of the new build nuclear programme. It is however important to assure this to the public." He also adds that in the past year a perception has been left in the media that the nuclear programme will go ahead without any knowledge of the cost and responsibilities that come with it. He hopes that the President's comments will help to change this perception." Dr. Chillers mentions that "contrary to popular sentiment the process of 9 600 MW of nuclear procurement has been extremely open and transparent. The vendor parades were well

**President Zuma said South Africa's nuclear-build programme would roll out at a pace the country can afford and that the plan was to introduce 9 600 MW of nuclear energy in the next decade.**

documented within the confidentiality constraints of a competitive bidding process...Government has cancelled an unaffordable tender process in 2009 indicating the commitment to affordability. I want to emphasize what the President said. We remain committed to the 9 600 MW of Nuclear New Build, but we will do it at a scale and pace the country can afford - that is what we should do....

Prof Slabber says the Koeberg Nuclear power station has been running smoothly now for more than 30 years: "Its load factor is 90% plus, compared to coal fired stations which run at 75%. It is the "cash cow" at the moment for Eskom. So with this as a clear example of a reliable and safe technology, why hesitate any longer?" Dr. Cilliers in his reply states that, "I believe very strongly that nuclear energy has the potential to transform

our country's economy as it has done for South Korea - catapulting it from the second poorest country in the world to an industrial and economic power house....The Russian nuclear energy firm Rosatom is seen as a favorite to win the bid for a second nuclear reactor in South Africa. ...

Source: <http://www.miningreview.com/>, 29 February 2016.

## **NUCLEAR COOPERATION**

### **INDIA-USA**

#### **India, US Rush to Firm Up Maiden Nuclear Cooperation Pact**

Eight years after the two countries initiated a historic civilian nuclear agreement, India and the US are engaged in hectic price negotiations to close a signature deal between NPCIL and Toshiba-Westinghouse (T-W) for six nuclear

reactors. The deal—the first of its kind involving a US company—could well be inked during Prime Minister Narendra Modi's visit to Washington for the Fourth NSS between March 31 and April 1.

The Modi government remains tight-lipped about the negotiations, but official sources confirm that Toshiba-Westinghouse made a formal "techno-commercial" offer to NPCIL and "uranium fuel offer" to the DAE for the Mithi-Virdi 6,000 MW power plant near Bhavnagar in Gujarat. NPCIL and T-W had already initialled a preliminary early works agreement in September 2013.

"Both offers are under examination. The total capital cost as well as per unit power cost is under consideration. A US Exim Bank team is expected in India shortly for the financing package. The deal will be signed once these issues are sorted out," said a senior official. The Toshiba-Westinghouse deal is also helped along by the fact that India and Japan signed a similar civilian nuclear agreement during Prime Minister Shinzo Abe's visit to India in December 2015.

"Commercial negotiations are on but it is not clear whether they can be closed by the time Prime Minister Modi reaches Washington. All efforts are being made to record forward movement," said a senior official. Nuclear industry sources based in India and the US have independently confirmed the price parleys with ballpark price figures of \$4.1 billion (Rs 27,000 crore) for two Westinghouse AP 1000 reactors. The first nuclear agreement after the 2008 India-US agreement was for building three and four units of 1,000 MW each for Kudankulam Power plant in Tamil Nadu with Russia in 2014 at a cost of nearly Rs 33,000 crore.

Top government sources said commercial negotiations with Westinghouse are required as Central Electricity Authority (CEA) has mandated the nuclear power price at Rs 6.50 per unit. To ensure that the commercial price remains within the mandated ceiling, India may negotiate for a bulk order of six AP 1000 light water enriched uranium nuclear reactors instead of two required for the first phase of plant commissioning. "If the two sides reach commercial close the two

companies will sign a general framework agreement with techno-commercial agreement as part of the annexure. Both India and US are seeking closure as this is the last year of Barack Obama administration with the government going lame-duck in a few months," said a senior official.

*Source: <http://www.hindustantimes.com/>, 10 March 2016.*

## **SAUDI ARABIA–RUSSIA**

### **Saudi Cabinet Ratifies Peaceful Nuclear Cooperation Agreement with Russia**

The Saudi cabinet ratified an agreement on 7 March on peaceful nuclear research cooperation with Russia signed last year. Moscow and Riyadh signed an intergovernmental agreement on cooperation in the peaceful use of nuclear energy on June 18, 2015. It notes that a corresponding decree for King Salman bin Abdulaziz Saud to sign has been drafted.

According to Russia's state-run atomic energy agency Rosatom, the deal for the first time in the history of Russian-Saudi relations creates a legal framework

for bilateral cooperation in the field of nuclear energy. It opens a number of prospects, including cooperation in construction and operation of reactors, nuclear fuel cycle services as well as education and training.

*Source: [http://sputniknews.com](http://sputniknews.com/), 07 March 2016.*

## **NUCLEAR NON-PROLIFERATION**

### **IRAN**

#### **Iran Missile Tests did not Violate Nuclear Deal: US**

The United States said that Iran's recent ballistic missile tests did not violate an international nuclear agreement, adding it will address the issue appropriately with "unilateral and multilateral tools". "This is not a violation of the nuclear agreement," Xinhua quoted White House spokesman Josh Earnest as saying on Tuesday, referring to "Joint Comprehensive Plan of Action" — the nuclear deal implementation mechanism.

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... Earnest, however, said an investigation was underway to review the incident and determine whether it should be raised at the UN Security Council. On 8 March, Iran test-fired several ballistic missiles in the ongoing military drills attended by the senior commanders of the Islamic Revolution Guards Corps (IRGC). The missile drill was aimed "to show Iran's deterrent power and also its ability to confront any threat against the (Islamic) Revolution, the state and the sovereignty of the country", the IRGC's official website said. Earnest stressed that if it was determined that Iran ballistic missiles tests were in violation of UN Security Council resolutions, Tehran could face "some consequences".

Also, US State Department spokesman John Kirby echoed Earnest that the tests, if confirmed, will not be a breach of the Iran nuclear deal. However, he warned that United States will not "turn a blind eye to this". "We have and we will use unilateral and multilateral tools to address this. If these latest reports are true, we'll take them up appropriately," Kirby said. Separately, under UN Security Council Resolution number 1929 adopted in June 2010, Iran is prohibited from working on ballistic missiles capable of delivering nuclear warheads.

*Source: The Times of India, 09 March 2016.*

**NUCLEAR PROLIFERATION**

**NORTH KOREA**

**UN Toughens Sanctions on North Korea in Response to its Nuclear Program**

Exasperated with North Korea's defiant testing of nuclear bombs and ballistic missiles, the United Nations Security Council voted unanimously on 2 March to severely toughen its penalties against the isolated country.

The development also reflected closer

cooperation between the United States and China on a longstanding dispute. The 15-member Council approved a resolution, negotiated for weeks by American and Chinese officials, that called for inspecting all cargo going in and out of the country, banning all weapons trade and expanding the list of individuals facing sanctions.

Diplomats said the resolution contained the most stringent measures yet to undermine the North's ability to raise money and secure technology and other resources for its nuclear weapons program. Much depends, however, on whether China — North Korea's leading trade partner and diplomatic shield — will enforce it. Samantha Power, the American ambassador to the United Nations, called the resolution "comprehensive, robust and unyielding," and said enforcement must be as well.

The Council has sought to hobble North Korea's nuclear weapons program before, but the country has repeatedly flouted those measures. In January, it conducted its fourth nuclear test and launched a rocket in February, even as diplomats were negotiating the current resolution.

The toughest component would require all countries

to inspect all cargo passing through their territory to or from North Korea. Inspections had been required only if there was reasonable suspicion of contraband aboard. The list of banned goods was expanded by the resolution to include luxury watches, Jet Skis and snowmobiles worth more than \$2,000. While that may seem inconsequential for such a poor country, Kim Jong-un, North Korea's ruler, has been known to use such items to curry favor with his fellow elites. The resolution also requires countries to expel North Korean diplomats accused of illicit activities. It prohibits North Korea from sending martial arts experts to train police officers in foreign countries, as a United Nations panel recently accused Pyongyang of doing in Uganda. Loopholes remain, however. North Korea can still buy oil and sell its coal and iron ore, as

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**Loopholes remain, however. North Korea can still buy oil and sell its coal and iron ore, as long as such transactions are not used for its nuclear weapons program; compliance would be difficult to prove. Although prices have fallen in recent years, minerals still account for 53 percent of North Korea's \$2.5 billion in exports to China, its chief supplier of oil.**

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The Obama administration welcomed passage of the resolution, with the spokesman Josh Earnest calling it "a strong message to Pyongyang." The administration also announced related actions by the Treasury and State Department that levied sanctions on five North Korean government entities, including the National Defense Commission, and a dozen North Koreans, including four high-level military officials, for their nuclear and weapons proliferation work. The designation freezes any properties they may have under American jurisdiction and bars American citizens from doing business with them. "Together, these actions reflect a strong and unified response to North Korea's provocative, destabilizing and dangerous activities," Treasury Secretary Jacob J. Lew said in a statement.

On 3 March morning, hours after the resolution passed, North Korea launched what appeared to be several short-range missiles off its east coast, the South Korean Defense Ministry reported. "The projectiles were launched around 10 a.m.," said a ministry spokesman, who spoke on customary condition of anonymity. "We have boosted surveillance and preparedness." No other details, such as the projectiles' range, were immediately available.

The Security Council measure is a narrow, diplomatic convergence between the United States and China. Beijing has repeatedly said it opposes Pyongyang's development of a nuclear weapons arsenal, and publicly rebuked the North on 2<sup>nd</sup> March for carrying out nuclear and rocket tests this year in "defiance" of international prohibitions.

China signaled that it saw the resolution as spurring peace talks soon, a goal that was welcomed by

nonproliferation advocates. Darryl Kimball of the Arms Control Association said the resolution could be useful as leverage to persuade Pyongyang to return to the bargaining table. But he also criticized the Obama administration's policy of "insisting on denuclearization as a precondition for talks to halt and reverse North Korea's advancing nuclear and missile capabilities." "In the next several weeks, it will be important for Washington and Beijing to communicate to Pyongyang that they are willing to formally resume negotiations," Mr. Kimball argued.

Beijing has been loath to draw attention to Pyongyang's human rights abuses, which the United Nations has documented and Washington has emphasized. The new resolution is not explicitly aimed at human rights violations, though Ms. Power made that link in her remarks to the Council. Referring to widespread malnutrition, Ms. Power accused North Korea on 2 March of caring more about expanding its nuclear weapons program than "growing its children."

The Chinese ambassador, Liu Jieyi, focused on the North's Jan. 6 and Feb. 7 tests, done in violation of previous resolutions. He also expressed skepticism about the effectiveness of sanctions, and used the occasion to criticize an American proposal to deploy a missile shield in South Korea. ... China's agreement to limit imports of North Korean coal and iron ore came with a condition: It should be demonstrated that such imports would support the North's illicit weapons programs.

By determining whether a shipment of coal from North Korea was for "livelihood purposes," China can maintain leverage it hopes to use to bring the North back to talks, but not to push it to the point of disintegration, South Korean analysts said. It is also up to China to control a booming network of trade and smuggling across its 870-mile border with North Korea. Those transactions have become a lifeline for the impoverished

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North Korean people, but most of them are also run directly by — or involve kickbacks to — Communist Party and military officials, according to the analysts.

Source: <http://www.nytimes.com/>, 03 March 2016.

## PAKISTAN

### US Concerned Over Pakistan Expanding Stockpile of Nuclear Weapons: Official

The US is concerned over Pakistan's fast-expanding stockpile of nuclear weapons which in combine with evolving doctrine increases the risk of an "accident", a top pentagon official has said. "Pakistan's nuclear stockpile continues to grow. We are concerned that this growth, as well as the evolving doctrine associated with tactical nuclear weapons, increases the risk of an incident or accident," Lt Gen Vincent Stewart, Director of Defense Intelligence Agency said during a Congressional hearing. "Islamabad continues to take steps to improve its nuclear security, and is aware of the threat presented by extremists to its programme," Stewart said during his testimony before the House Armed Services Committee on Worldwide Threats.

Pakistan will face internal security threats from militant, sectarian and separatist groups this year, he said, adding that ISIS in Khorasan and al-Qaeda in the Indian Subcontinent will also remain significant security concerns for Islamabad. Counter-insurgency operations along Pakistan's western border and paramilitary operations in Karachi have had some success in reducing violence and are likely to continue, he said. Tensions between India and Pakistan subsided in late last year following high-level diplomatic engagement and an agreement to continue the talks next year, he added.

However, there remains a significant risk that tensions could once again escalate with little

warning, particularly if there is a large-scale terrorist attack in India, Stewart said. Pakistan has ruled out any change in its "dynamic" policy of increasing its nuclear weapons, dismissing the US' request in this regard citing India's rapid military modernisation.

Our nuclear capacity is a deterrent against Indian capacity. Deterrent is not a static concept. It is a dynamic concept. If your adversary goes on expanding its capacity, then you have to respond. It is not something that you can take something for granted," Sartaj Aziz, foreign affairs advisor to Pakistan's prime minister said on 2 March.

Source: <http://www.business-standard.com/>, 03 March 2016.

## NUCLEAR DISARMAMENT

### INDIA

### Marshall Islands Takes on India in Nuclear Disarmament Fight

Nobody expects the Marshall Islands to force the three powers to disarm, but the archipelago's dogged campaign highlights the growing scope for small countries to get a hearing through global tribunals. A small chain of Pacific islands - some of which were once vapourised by atomic bomb tests - sought

in court on 7 March to force India, the world's second-most populous country, to get on board with nuclear disarmament.

The republic of the Marshall Islands, which has a population of less than 70,000 people, says that the world's nine nuclear weapons states have violated various obligations to negotiate in good faith to dismantle their nuclear arsenals. Three of them - India, Pakistan and Britain - are bound by previous commitments to respond to cases brought at the International Court of Justice. India was the first to be heard, on 7 March, followed during the week by Pakistan and Britain. They say

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the claim is beyond the jurisdiction of the court in The Hague.

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The island republic, a US protectorate until 1986, was the site of 67 nuclear tests by 1958, the health impacts of which linger to this day.

The other nuclear powers - including declared powers China, France, Russia and the United States and undeclared nuclear states Israel and North Korea have not responded to the suit the islands filed last year. The islands say the declared states are bound to negotiate disarmament by the 1970 NPT, while the other states face similar obligations under customary international law. ...

*Source: <http://www.thehindu.com/>, 08 March 2016.*

### **No Legal Obligation to NPT, Says India**

Weeks before the Nuclear Security Summit, the government reminded the world that India does not have any "legal obligation" to the NPT. "Government believes that given our consistent and principled position on the NPT, to which India is not a party, its provisions cannot be extended to India as a legal obligation" a diplomatic source told *The Hindu*. This was in response to a question on the case that Marshall Islands from the Pacific Ocean region has lodged at the International Court of Justice (ICJ) against all the major nuclear states, including India, for possessing nuclear weapons and for not supporting a global test ban pact.

**Legal team at ICJ:** India has sent a legal team to the ICJ in The Hague, where Marshall Islands has at present instituted proceedings against India, "contending breach of customary law obligations following from the NPT." Article VI of the NPT demands that each member state of the NPT undertake "negotiations in good faith on effective measures relating to

**India does not have any "legal obligation" to the NPT. "Government believes that given our consistent and principled position on the NPT, to which India is not a party, its provisions cannot be extended to India as a legal obligation.**

cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."

India has already made a written presentation to the ICJ reiterating that Marshall

Islands' argument regarding the obligations flowing from Article VI of the NPT is not valid before India which is not a signatory to the NPT. "India has reiterated its position on global nuclear disarmament," an official told *The Hindu*. India, the official said, continued to support non-discriminatory global nuclear disarmament.

The case from the Marshall Islands has been on the agenda of the ICJ since the tiny archipelago in the Pacific Ocean lodged the case in 2014 seeking greater international attention to the issue of comprehensive test ban treaty. Ever since, Marshall Islands' campaign has acquired stronger support, especially since it suffered due to the nuclear tests conducted in its territory by the US.

*Source: Kallol Bhattacharjee, The Hindu, 09 March 2016.*

### **RUSSIA**

#### **Russia to Disarm World's Largest Nuclear Ballistic Missile Submarine**

In 2016 Russia is set to disarm the missile system of the Typhoon-class Arkhangelsk submarine, the largest in the world. The disarmament will be carried out in accordance with the New START agreement between Moscow and Washington.

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Working in accordance with the New START treaty between Russia and US, the country's leading Zvezdochka shipyard in the northern Russian city of Severodvinsk will disarm the missile system of the Arkhangelsk submarine, the shipyard's

press service told TASS news agency on 11 March. "We will remove the covers of the submarine's missile launchers and seal them, thus making it impossible to use the vessel's missile weapons," the press

service said. "We are not talking yet about dismantling the submarine itself. The tender for this procedure has not yet been announced." According to the data published by the Russian nuclear agency Rosatom, the sub's disarmament is estimated to cost some 28 million rubles (about US\$ 400,000).

The nuclear-powered ballistic missile submarine Arkhangelsk TK-17 was designed in 1987 under the Project 941 'Shark' (or 'Typhoon' according to NATO classification). The project was aimed to equip the Soviet Navy with nuclear-powered ballistic missile submarines, and resulted in the creation of the largest class of submarines ever built – large enough to accommodate decent living facilities for the crew of 179 when submerged for months on end, and to stock an arsenal of 20 intercontinental ballistic missiles.

Three of the six Typhoon-class submarines built in the 1980s have already been dismantled at the shipyards in Severodvinsk. Of the three that remain, Arkhangelsk and Severstal are set to be dismantled. Dmitri Donskoi just recently underwent a modernization procedure and is now equipped to test the latest sea-based missile system Bulava.

The New START treaty (on Measures for the Further Reduction and Limitation of Strategic Offensive Arms), which was designed to reduce American and Russian nuclear stockpiles, came into force in 2011. It replaced the previous 1991 agreement, introducing lower ceilings for the numbers of warheads and delivery systems deployed. Commenting on the progress made on the treaty's fifth anniversary in February, US Secretary of State John Kerry complimented both sides on successful cooperation in the field.

"[New START treaty] continues to be an area of cooperation and continued dialogue between the United States and Russia. I share President Obama's strong belief that our two countries,

which ushered in the era of nuclear arms, have a special responsibility to lead the world beyond it," he said in a statement.

However, the latest moves by the US – such as plans to upgrade 180 B61s strategic bombs stocked in European air bases to a modernized B61-12 version – have raised doubts whether the US adheres to the NPT. Opponents of the program have argued that instead of scaling down

atomic weapons stockpiles in accordance with the NPT, the overhaul is actually creating more states hosting modern nuclear weapons – a provocation that theoretically weakens Russia's deterrent.

Moscow keeps the presence of American nuclear weapons in Europe in mind when shaping its own military policies as reflected in Russia's newest military doctrine published in 2014, spokesperson for the Foreign Ministry Maria Zakharova told German television last year. "The comprehensive analysis of the situation points to the threat posed by the increasing military capability of NATO and its endowment with global functions, which it performs in violation of the international law, as well as the encroachment of the military infrastructure of NATO members on the borders of the Russian Federation," she said.

Source: <https://www.rt.com/>, 11 March 2016.

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**An emergency has been declared within the nuclear plant at Kakrapar in Gujarat after a major heavy water leak in a nuclear reactor. No worker has been exposed to radiation, said officials, adding that the employees remained sequestered till their shift ended, which is standard operating procedure for a crisis.**

## **NUCLEAR SAFETY**

### **INDIA**

#### **Gujarat Nuclear Plant Shut Down After Major Leak, All Workers Safe**

An emergency has been declared within the nuclear plant at Kakrapar in Gujarat after a major heavy water leak in a nuclear reactor. No worker has been exposed to radiation, said officials, adding that the employees remained sequestered till their shift ended, which is standard operating procedure for a crisis. The workers were allowed

to go home after they had been counted and accounted for as officials checked to ensure that no radioactivity was reported outside the plant.

Officials at India's nuclear operator, NPCIL, told NDTV "The reactor has shut down safely and no radiation has leaked out". According to Nalinish Nagaich a senior official at NPCIL, no worker was stationed in the affected area. Officials said the safety checks and systems kicked in as intended for emergencies. The nuclear reactor is slowly cooling down and is in a "safe stage" confirmed Dr Sekhar Basu, Chairman of the Atomic Energy Commission. The heavy water leak affected the reactor's cooling system. If emergency cooling systems do not kick in after this sort of glitch, the temperature can rise so much that the core of the reactor can melt down completely. Heavy water, formed with a hydrogen isotope, is used in Indian reactors as a preferred cooling agent.

Source: <http://www.ndtv.com/>, 12 March 2016.

## **INDIA-JAPAN**

### **5 Year After Fukushima, India Puts Japanese Food Imports Off Radioactive Scanner**

While India has decided to stop scanning Japanese food imports after five years of the Fukushima Daiichi nuclear disaster in 2011, US, Germany, Turkey, Russia and Australia still scans all products coming in from Japan. ... The imports' division of the Food Safety and Standards Authority of India (FSSAI) under the Union Health Ministry has recently issued an order saying, "The advisory dated 15.03.2011 issued regarding monitoring of food articles imported from Japan for radioactive contamination, issued earlier as a temporary measure in 2011, is hereby withdrawn." The order has been conveyed to the customs department and the food safety commissioners of all states. The abrupt end to the practice has, however, alarmed experts. ... The move by the Indian government can be seen as an attempt to bolster the already strong business and cultural ties with Japan.

The withdrawal of scanning of food items from Japan comes even as the US Food and Drug Administration continues to monitor Japanese

food imports for any likely radioactive presence. Along similar lines, countries like Germany, Turkey and Russia also scan all imports from Japan. There are also checks on vessels and containers from Japan for any radioactive contamination by the US, the Netherlands and the EU. Australia, which imports automobiles from Japan, also keeps a strict check on radiation. In March 2015, radiation was found in sample of green tea imported from Japan to the US. A study by Stanford University and Stony Brook University on radioactive levels in the Pacific Ocean found high levels of radioactive contamination in Bluefin tuna caught off the shores of California.

Recently, a study published in the journal Proceedings of the National Academy of Sciences of the US stated that freshwater fish and ocean bottom dwellers around Fukushima are at a higher risk of radioactive contamination compared to most other types of ocean fish in the same area.

Off the radar:

- FSSAI has stopped monitoring food imports from Japan for radiation after Fukushima Daiichi N-disaster in 2011.
- In March 2015, radiation was found in sample of green tea imported from Japan to the US.
- Stanford University and Stony Brook University found radioactivity contaminated Tuna fish from the off shore of California.
- In 2014-15, India's agricultural import from Japan was of the order of \$6.51 million.
- Principle imports were chilled fish, seeds, vegetable seed, confectionery, among others.
- FSSAI officials say they have not found radiation in any food imports from Japan.

Source: *India Today*, 06 March 2016.

## **JAPAN**

### **Court Orders Japanese Nuclear Reactor to Shut Down**

Court issued an unprecedented order on 9 March for a nuclear reactor near Kyoto to stop operating and ordered a second one to stay offline.

The Otsu district court, which issued the injunction, said the emergency response plans and equipment designs at the two reactors have not been sufficiently upgraded after the 2011 Fukushima nuclear disaster. The order requires Kansai Electric Power Co to shut down the No. 3 reactor and keep the No. 4 unit offline at the Takahama plant in Fukui prefecture in western Japan, home to about a dozen reactors.

The two reactors restarted this year after a high court in December reversed an earlier injunction by another court. The No. 3 reactor, which uses a riskier plutonium-based MOX fuel, resumed operation in late January, while the No. 4 reactor had to be shut down late last month after operating for just three days because of a series of technical problems. Kansai Electric said it would abide by the decision and start the shutdown procedures for the No. 3 reactor 3<sup>rd</sup> March morning. The utility, meanwhile, said that the decision was "disappointing" and that it planned to appeal.

The decision reflects Japan's divisive views on nuclear safety and leaves only two of the country's 43 reactors in operation. The Takahama plant has been a major concern for the region. Residents say a major accident at the plant, which sits right next to Kyoto, a major tourist destination, would destroy tourism. They also worry about radiation impact on nearby Lake Biwa, a key source of drinking water for western Japan.

Judge Yoshihiko Yamamoto said the operator has not fully explained exactly how it has upgraded safety features at the two Takahama reactors under the post-Fukushima safety standards. The utility has not fully explained its design philosophy, its measures to mitigate power loss or how to carry out evacuation plans in case of a

severe accident and a massive tsunami, he said in the ruling. The decision also shakes the credibility of the stricter safety requirements installed following the Fukushima disaster. The ruling on 9<sup>th</sup> March supported concerns by residents and experts that the stricter standards still do not require utilities to have adequate evacuation plans before applying to restart reactors.

Source: <http://timesofindia.indiatimes.com/>, 09 March 2016.

### **Crippled Fukushima Reactors are Still a Danger, 5 Years After the Accident**

**The Otsu district court, which issued the injunction, said the emergency response plans and equipment designs at the two reactors have not been sufficiently upgraded after the 2011 Fukushima nuclear disaster. The order requires Kansai Electric Power Co to shut down the No. 3 reactor and keep the No. 4 unit offline at the Takahama plant in Fukui prefecture in western Japan, home to about a dozen reactors.**

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... Japan in February started up a third reactor among those that had been shut down. But even as the government seeks to leave the disaster behind, Fukushima remains a wound that will not heal - for former residents, the local landscape and for the Japanese psyche. Two-thirds of the populace dreads another accident

enough to oppose the restarts. More than 1,100 square kilometers of villages, mountains and forests remain uninhabitable, and future generations will still be cleaning up the plant site, according to Japan's Ministry of Economy, Trade and Industry (METI).

Echoing citizens' groups, some scientists are complaining that important questions about the disaster's impact are not being addressed.

Authorities, they suspect, are subtly discouraging certain kinds of scientific research, possibly because they fear findings that could further alarm the public. In some ways they want this to go away and say things are back to normal, observes marine radiochemist Ken Buesseler of Woods Hole Oceanographic Institute in Woods Hole, Mass.

Exacerbating widespread suspicions of a cover-

up, this February Tepco admitted it had waited for two months after the accident before announcing the meltdowns - which possibly delayed evacuations and endangered lives. The uranium fuel in three of the six reactors eventually melted, and explosions blew holes in the roofs of three reactor buildings, releasing radioactive iodine, cesium and other fission products over land and sea. Emergency managers on site, desperately trying to cool the molten cores, poured water into the damaged reactor buildings using fire-hoses. As a result, highly contaminated water flowed directly into the Pacific Ocean.

Since then, Tepco has substantially cleaned up the site. It has capped shredded roofs, removed spent fuel from a damaged reactor and constructed ice walls to stanch the flow of groundwater that was washing contaminants from the site into the ocean. Because the molten fuel still generates heat by radioactive decay, however, Tepco has to keep pumping water through the reactor buildings and collecting as much as possible - some 400 cubic meters a day, stored in on-site tanks. Around 8,000 workers are now assisting in the cleanup.

Not all is going well, however. Engineers still have to locate the molten fuel, which seems to have melted through steel vessels. It remains so radioactive that no humans can enter the reactor buildings. Tepco has "no idea where and how much fuel debris is in the reactor now," says nuclear engineer Tadahiro Katsuta of Meiji University. Last April, Tepco sent a robot into one of the buildings to photograph the damage, with mixed results, and it also intends to use robots to find and remove the globs of molten uranium, steel and other substances by 2021. According to METI, fully cleaning the site will require half a century, when most of the dangerous radionuclides will have decayed. Where the lethal debris will end

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The 1,000 or so tanks of contaminated water, which leak from time to time, pose another headache. Tepco is removing the most abundant contaminant, cesium, from the cooling water before it is sent to the storage tanks, but the water retains high concentrations of radioactive

strontium and tritium. This February, the company reported a spike in strontium levels at the plant site—likely indicating a tank leak. So the company is painstakingly cleaning the stored water of all radionuclides except

tritium, which is difficult to separate out. Because tritium concentrations remain many times higher than the drinking water level prescribed by the WHO, however, fishery cooperatives are not allowing its release into the ocean.

Solid waste is piling up as well. Cleaning streets, houses and playgrounds within the evacuated zone, which stretches some 50 kilometers northwest of the plant site, has generated

millions of bags of contaminated topsoil and debris, which also await a final resting place. Almost 800 bags got carried off by typhoon Etou last year, however, and were deposited miles away, says Hajime Matsukubo of the

Citizen's Nuclear Information Center in Tokyo. Hundreds were never found.

Meanwhile, after five years, some 100,000 people are still waiting to return to their homes. Last year the Japanese government announced that it will eventually lift evacuation orders for regions where a person would receive an annual radiation dose of 20 millisieverts or less. That figure, several times higher than what the International Commission on Radiological Protection recommends for safety, poses an "unacceptable"

risk, Matsukubo says. ... No matter: a year after this zone is opened up, Tepco will stop providing compensation to its 32,000 former residents. Exile may be permanent, however, for tens of thousands of people from the most contaminated areas.

Accidents, ailments and trauma caused by the evacuation has led to 3,200 deaths, including many suicides, according to the *World Nuclear Industry Status Report*, 2015. The number of cancer cases is hotly disputed. A 2013 study published in *Energy and Environmental Science* estimated roughly 1,000 future cancer deaths from radioactive cesium, too few to be distinguished from those caused by other factors. Last year, however, an ultrasound screening program of around 300,000 children who had been living in the affected area revealed a startling 110 thyroid cancers—a 30-fold increase from the norm, allegedly caused by radioactive iodine.

...Other studies indicate that the disaster has adversely affected many other creatures—in particular those living in the forests, which have not been cleaned. In a count of 57 species of birds in 400 locations of varying radioactivity, ecologists Anders Møller of the National Center for Scientific Research in Orsay, France, and Timothy Mousseau of the University of South Carolina documented sharp reductions in abundance and diversity in the areas of higher contamination. The team's ongoing studies in Chernobyl, which has a similar biotope, may indicate why: many birds have "cataracts in the eyes, smaller brain size, tumors, reduced fertility, especially in the males," says Mousseau—all of which decrease their ability to survive.

In another study, conducted in less contaminated areas, a Japanese team found physiological and genetic damage in an ubiquitous species of butterfly, the pale grass blue. Other researchers have documented defects in the growth of almost

all fir trees in highly contaminated areas, abnormalities in aphids near the power plant and the activation of a DNA-repair mechanism in rice plants in response to radiation. Despite such scattered findings, however, no comprehensive evaluation exists of how the terrestrial ecosystem is faring under the radioactive onslaught.

Another concern is radioactive strontium. Scientists say levels in seawater near the plant are not declining, possibly because of recurrent leaks from the on-site tanks. "You could actually see in the ocean when one of these tanks would leak—you'd get a big spike in Strontium-90," Buessler notes. Whereas cesium behaves in organisms rather like potassium, being absorbed and excreted fairly quickly, strontium is chemically similar to calcium and accumulates in bones. Although consumers of Fukushima's fish may be safe, because they tend not to eat fish-bones, the radionuclide could become a long-term concern for a few of the fish themselves.

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Source: Excerpted from article by Madhusree Mukerjee. <http://www.scientificamerican.com/>, 08 March 2016.

## **USA**

### **Bird Poop Shut Down Indian Point Nuclear Plant**

A gloop of bird poop was responsible for shutting down the Indian Point nuclear plant for a few hours last December, according to a state-commissioned report into the incident.

The Westchester power plant automatically shut down on Dec. 14, 2015 when a string of dropping from a "large bird" fell into some of the plant's electrical equipment and caused the reactor's automatic shut down to trip, according to findings by Entergy, the company that runs the plant.

"Damage was caused by a bird streamer. Streamers are long streams of excrement from large birds that are often expelled as a bird takes off from a perch," company officials said in the report, ordered by Gov. Cuomo. "If a streamer contacts an energized conductor, the electrical current may travel through the streamer back to the bird or pole/transmission tower. The result may be a bird electrocution, power outage, and/or line trip."

Last December's unplanned shut down was the 13th since June 2012. It's not clear how many of those were due to birds, but the dropping did not put the plant in any danger of causing harm to the public, the report said.

Source: <http://nypost.com/>, 03 March 2016.

**According to the World Nuclear Agency, China has 30 existing nuclear power stations, 24 under construction and additional reactors in the planning stages. Additional reactors, including some of the world's most advanced, will give a three-fold increase in nuclear capacity to at least 58 gigawatts by 2020-21.**

most advanced, will give a three-fold increase in nuclear capacity to at least 58 gigawatts by 2020-21," it said in a statement. "It is expected a there will be a further 150GW by 2030 and much more by 2050."

Uranium prices still recovering from Japanese nuclear disaster. Mr Boyle said Asian markets saw nuclear power generation as a necessity to meet their energy requirements. However, he admits that price has been relatively low. ... "In general, prices have been relatively depressed for a long period of time," Mr Boyle said. "And it's only been in the last year or so that we're starting to see an increase in demand. "It's taken a

good four years for the prices to improve since the incident in Japan. "But the market has stabilised and we're starting to see the prices recover, and we expect that to continue into the near future."

Mr Boyle said the contract price for uranium was \$63.31 in 2015 (\$US47) a pound, which was problematic for Australian producers. "Most Australian producers are in the second half of this cost curve," he said. "Olympic Dam [in South Australia] is the lowest cost producer in Australia and I believe their strategy is to go for scale so they can sell larger volumes of uranium. "Four Mile [in South Australia] is not too bad, it started mining recently and is recovering the higher grade from their western deposit. "Ranger [in the northern Territory] is high cost and despite processing previously stockpiled ore and realising some of the labour productivity gains of 2015, its key issue is its high decommissioning costs.

"That's arising from the distillation of water in the previously mined pits." New entrants banking on better uranium price. Australia is rich in uranium endowment. It is estimated to hold more than 30 per cent of all known reserves and that figure is expected to increase dramatically as more mines come online. Recent changes to state and federal government legislation has opened up

## URANIUM PRODUCTION

### GENERAL

#### **Uranium Price Increase Around Corner as China and India Look to Nuclear to Reduce Carbon Emissions**

Australia has the ability to become a world super power in the supply of uranium but it could take from five or 10 years. That is the opinion of uranium analysts CRU, which argues that nearly all global uranium companies remained cash-flow positive in 2015. The company's Matthew Boyle said the industry was placing hope and faith in Australia as a supplier.

... Although there has been a move away from nuclear in some parts of Western Europe and the USA, countries in South East Asia and China and India are embracing the technology as they look to reduce their emissions profile. According to the World Nuclear Agency, China has 30 existing nuclear power stations, 24 under construction and additional reactors in the planning stages.

"Additional reactors, including some of the world's

much of the nation to uranium exploration.

According to the Minerals Council of Australia, 8,291 tonnes of uranium oxide were exported in 2012-13 with an estimated value of \$800 million. It is a lucrative commodity option that has sparked a mini-rush of sorts, especially in Western Australia where companies like Canada's Cameco and Australia's Toro Energy are on the hunt.

But it all comes down to price, and as for many, the eventual price determines if uranium explorer Vimy Resources will become an operating uranium miner. CEO Mike Young said the contract price was generally private and too much was made of the spot price for uranium, which made up 15 per cent of the market. "The price is flat but I like to refer to it as the Stephen Bradbury of commodities, in fact last year it was the best performing commodity," he said

"But the problem with uranium pricing is that the price we see is the headline price and the one that drives sentiment is the spot price. "But the spot price is very small, and it's dominated by traders. "In 2015, over 70 per cent of sales were by traders. So the end users aren't involved in the price very much." So what would Vimy Resources need to make to turn a profit? "\$US50 pound is break even, and we'd be looking for \$US65," Mr Young said. "If we get that price we're in cover."

Source: <http://www.abc.net.au>, 10 March 2016.

## **NUCLEAR WASTE MANAGEMENT**

### **SWITZERLAND–USA**

#### **Swiss Nuclear Waste Arrives at Savannah River Site**

The National Nuclear Security Administration this month announced that Switzerland is now free of

all separated plutonium, partly because of a shipment of about 20 kilograms that arrived at Savannah River Site in February. The plutonium was initially used in research and development of fuel elements for nuclear reactors and had been stored for several decades at the Paul Scherrer Institute in Villigen, Switzerland.

NNSA press secretary Francie Israeli said the operation was conducted by the Office of Material Management and Minimization, "which works cooperatively with countries to remove or dispose of high-risk nuclear materials at civilian facilities across the globe that could be used by terrorists to make an improvised nuclear device." The material arrived at SRS by way of Joint Base Charleston, S.C.

Francie Israeli said the NNSA determined that the shipment does not require the preparation of an environmental impact statement because it isn't considered a major activity. An environmental assessment prepared in December, however, evaluated the impacts associated with transporting material from foreign countries to the US for disposal.

"Through this cooperative effort, Switzerland has eliminated all the separated plutonium from its country, which supports international goals of consolidating and minimizing inventories of nuclear material," said Anne Harrington, NNSA's deputy administrator. "These efforts are an example of the important nonproliferation mission of NNSA and an accomplishment for risk reduction that will be highlighted at the upcoming Nuclear Security Summit in Washington, D.C., later this month."

Source: <http://chronicle.augusta.com/>, 10 March 2016.

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**TAIWAN**

**Taiwan Planning to Send Nuclear Waste Overseas for Reprocessing**

The state-owned Taiwan Power Company (Taipower) is planning to ship its spent nuclear fuel overseas for reprocessing, with France being a possible destination, Economics Minister John Deng said on 11 March.

Deng's statement was in response to a question from Democratic Progressive Party Legislator Chen Ou-po during an interpellation session at the Legislative Yuan. Chen pointed out that as of January this year, the three operational nuclear power plants in Taiwan had produced 17,552 spent fuel rods, and the number will continue to increase as long as the power plants remain in

service. Deng said Taipower indeed has a plan to send nuclear waste overseas for reprocessing, and France is willing to do it.

As Taiwan is not able to handle high-level nuclear waste, Chen proposed shipping the waste to the United States, the builder of the three functioning nuclear power plants and supplier of Taiwan's nuclear fuel. Also during the session, Premier Simon Chang apologized on behalf of the government to the residents of Orchid Island for failing to honor its promise to remove nuclear waste from the outlying island. A nuclear waste storage facility was built on the island in 1982. In recent years, local residents have staged rounds of protests to demand Taipower remove the waste from the island.

*Source: <http://focustaiwan.tw/>, 03 March 2016.*



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