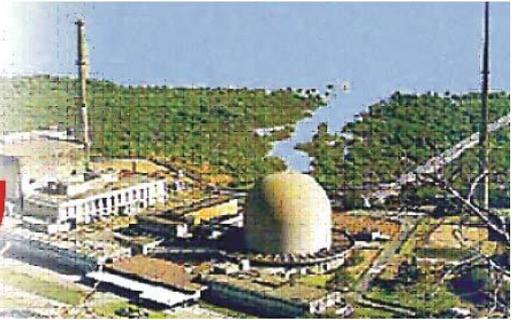


# NUCLEAR SECURITY



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

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## OPINION – Rakesh Sood

### Looking Beyond Nuclear Liability

A month has passed since US President Barack Obama was in Delhi as the chief guest at the Republic Day and had his famous “chai pe charcha” with Prime Minister Narendra Modi. An overview of the Indian commentary about the Obama visit would reveal that breaking the logjam on nuclear liability is perceived as its most significant outcome. Both leaders focussed on it at their joint press conference and Paragraph 43 of the Joint Statement states that “the Leaders welcomed the understandings reached on the issues of civil nuclear liability and administrative arrangements for civil nuclear cooperation, and looked forward to US-built nuclear reactors contributing to India’s energy security at the earliest.”

A lack of details initially led to considerable speculation about the nature of the breakthrough and the assurances provided. To clarify matters, the MEA took the unusual step of putting out a seven page ‘Questions and Answers’ explanatory paper which sparked yet another round of debate on whether this was really a breakthrough or not. However, such a narrow focus on nuclear liability misses the larger picture; there is an underlying broader political objective which has driven the nuclear dialogue

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Following their meeting in Washington last September, the two leaders had “reaffirmed their commitment to implement fully the India-US civil nuclear cooperation agreement”. Both leaders realised that the nuclear liability issue was a hurdle that needed to be overcome to take the relationship forward. A contact group was established and met thrice in the two months leading up to the Republic Day summit. In January, the officials had reached the limits of their respective negotiating mandates in the contact group. Mr. Modi and Mr.

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Obama understood that the issue was not whether Westinghouse and GE would set up nuclear power plants in India (that process was bound to take many months, even years, of complex technical and financial negotiations) but whether the two leaders could lead from the front on this issue.

Mr. Modi and Mr. Obama agreed that the matter should not be postponed any longer. Second, Mr. Modi was able to convince Mr. Obama that despite a majority in the Lok Sabha, he was not in a position to amend the Liability Law or the Rules. Such a move would create a political firestorm that could target senior members of his Cabinet, including

both the Finance Minister and the Foreign Minister who were Opposition leaders in the Rajya Sabha and the Lok Sabha respectively when the Liability Bill had been debated in Parliament in 2010. The negotiators were accordingly directed to work out a solution based on political assurances and risk management procedures being developed

by Indian insurance, instead of legal amendments. There was an implicit risk here. Would these understandings stand up to legal scrutiny in an Indian court, in case they were challenged? However, both leaders decided that the risk was worth taking because of their shared conviction that the bilateral relationship needed to move beyond the liability stranglehold.

**An Explanatory Exercise:** There were two principal sticking points in the 2010 Civil Liability for Nuclear Damage Act (CLNDA). The first was Section 17 which enables the operator of the nuclear installation (under Indian system, the NPCIL), after paying compensation to the victims of nuclear damage, to have the right of recourse against the supplier, subject to certain conditions. Two of these conditions, namely when such a right is part of the written contract between supplier and operator, and second, when the nuclear accident has happened because of the intent to cause damage, are accepted as part of the international

legal regime pertaining to nuclear liability.

The third condition introduced in Section 17(b) was novel and gave the operator a right of recourse against the supplier if the incident had been due to 'supply of equipment or material with patent or latent defects or substandard services'. The supplier community interpreted this provision as ambiguous and one that rendered it vulnerable to open-ended liability claims. The new explanation seeks to address it by relating Section 17(b) to 'actions and matters such as product liability stipulations/conditions or service contracts' between the operator and the supplier and

therefore to be dealt with in the context of such contractual terms. The attempt is to remove the open-ended nature of possible liability claims by limiting these to the terms and conditions of the contract.

**Insurance:** The second sticking point was Section 46 which stated that the

provisions of the CLNDA 'were in addition to, and not in derogation of, any other law for the time being in force', leading to concerns among the suppliers that they could be subjected to multiple and concurrent liability claims. This is sought to be addressed by explaining that all civil claims can only be brought under the CLNDA since that was the intention behind this special legislation and further, that these claims would come under the jurisdiction of the specially constituted Claims Commission, thereby excluding any jurisdiction of foreign courts.

The concept of risk management behind the setting up of the Indian Nuclear Insurance Pool has been elaborated in the explanatory paper to point out that the premium costs will be modest. For a policy of Rs.1500 crore, the annual premium would be between Rs.1.5 crore and Rs.3 crore (calculated at 0.1 to 0.2 per cent as per global practice), hardly a large sum given that the capital cost of a 1000 MW reactor would be upwards of Rs.10,000 crore.

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A Nuclear Liability Fund can be operationalised by a nominal surcharge of say 5 paise per unit of nuclear power which at current levels of installed nuclear power can provide about Rs.200 crore annually, thus enabling the government to recover its original contribution to the liability corpus fairly quickly.

**Removing Legacy of Mistrust:**

Lawyers and risk analysts can continue to debate the legal validity of these explanations as well as the probabilistic risk assessment model employed for the insurance pool being set up, but this misses the larger picture. For Mr. Modi and Mr. Obama, the understanding reached in January is a means to push the nuclear dialogue process forward to its logical conclusion. It has been one of the most divisive issues in the relationship and its legacy of mistrust has made it difficult to move the strategic partnership forward. Neither Mr. Modi nor Mr. Obama can ensure that Westinghouse and GE will set up nuclear power plants in India but they can certainly lay the nuclear ghost to rest.

The first thing now is to ratify the Convention on Supplementary Compensation (India had signed the CSC in 2010). The explanations should help smoothen the process. Once the ratification is done, it will strengthen the Indian government's stand on the interpretations and enable the NPCIL to open preliminary techno-economic discussions with US suppliers, while offering similar assurances to other foreign suppliers. Simultaneously, the NPCIL should bring its contract language into conformity with these explanations, which is presently not the case, so that domestic suppliers stand reassured.

Finally, 2015-16 provides a suitable time window that must be exploited to bring about India's full participation in the NSG. The momentum generated in

2008 when the NSG approved the waiver from its guidelines to permit civilian nuclear cooperation with India was only possible with US diplomatic heavy lifting. Much of this momentum has been lost in recent years and needs to be revived. With its newfound diplomatic activism, India needs to step up its outreach at multiple levels with NSG members. This process needs to be coordinated with the US so that at the 2016 NSG plenary, India formally joins the Group. This will end the

isolation of India's nuclear establishment that began in 1974 and reintegrate India into legitimate civilian nuclear trade and commerce while acknowledging India's commitment to non-proliferation.

At a bilateral level, US support in bringing this process to its logical conclusion would remove the mistrust that has often cast a shadow on the relationship. Mr. Modi and Mr. Obama's recourse to political pragmatism to get around the nuclear liability hurdle reflects their willingness to look beyond it at the larger picture. What is now needed is a plan with clear objectives which helps in realising the goal of making the India-US relationship the defining partnership of the 21st century.

*Source: The Hindu, 16 March 2015.*

**OPINION – Iskander Rehman**

**Going Nuclear at Sea**

In August 2013, when the Arihant's nuclear reactor finally went critical, the event was thus widely hailed, both in India and abroad, as a major technological and symbolic milestone. Currently undergoing sea trials, the Arihant is destined to be the first vessel in a flotilla of up to five indigenously produced SSBNs, and it has been reported that a sister

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vessel, the INS Aridhaman, is nearing completion. Since the Pokhran-II series of nuclear tests in 1998, the Indian government has repeatedly iterated its desire to attain a credible minimum nuclear deterrent, structured around what nuclear strategists refer to as a triad, that is, a mixture of aircraft, land-based mobile missiles and naval assets. India's nuclear doctrine states that it is a no-first-use power, and it is in this light that one must view the importance attached to the sea-based leg of its nuclear deterrent.

Indeed, the survivability and overall resiliency of India's nuclear arsenal has become a growing concern for military planners

in New Delhi, particularly as Beijing continues to make rapid advances in missile, space and cyber technology. Nuclear submarines, provided they are sufficiently quiet, are still considered to be the most survivable of nuclear platforms, due to their mobility and discretion. Placing nuclear assets underwater puts them at a safer distance from a crippling first strike. The development

of the Arihant and its successors therefore constitutes the next logical step in Delhi's quest for an assured retaliatory capability.

It is important to note, however, that while the launch of India's first indigenous SSBN constitutes a great accomplishment, it is also only the first step in what promises to be a long and onerous process. India's naval nuclear journey has only just begun.

Going forward, the Indian navy will face three sets of nuclear challenges. The first set is in the technological domain, as the navy struggles to acquire the capability for continuous at-sea deterrence. The second set of difficulties will need to be addressed within the navy itself, as its officers begin to grapple with the importance of their service's new nuclear role. Finally, Indian naval planners will also have to contend with their Pakistani counterparts' development of what can best be described as a "naval nuclear force-in-

being".

When the Arihant is finally commissioned, it will be fitted with 12 Sagarika K-15 SLBMs. The Sagarika, however, only has a strike radius of about 750 to 800 km, which many analysts rightly consider inadequate. Indeed, with such a short range, the Arihant could not reach Islamabad, let alone China's strategic centres. The DRDO is currently working on two longer-range SLBMs: the 3,500-km range K-4, which recently underwent a successful test launch from an underwater pontoon, and the 5,000-km range K-5, which is still in the design phase.

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According to sources, the Arihant is fitted with four universal tube launchers, which can each carry either three K-15 missiles or one K-4 missile. Observers have raised questions, however, over the compatibility of the K-4's height with the submarine's 10.4-m hull. If the length of the K-4 cannot be shortened, the Arihant may need to be retrofitted with a hydrodynamic outer development, or "bump."

Even if the DRDO's engineers do succeed in squeezing the K-4 aboard, the missile's range remains somewhat unsatisfactory. It would require India's nuclear submariners to operate on the northeastern fringes of the Bay of Bengal in order to effectively target China's major metropolises, rather than within the more sanitised waters abutting India's eastern seaboard. The K-5 is rumoured to stand at a height of about 12 m, which rules out its deployment aboard the Arihant. The second major technological limitation is that of the Arihant's nuclear reactor. Reportedly based on first- or second-generation Soviet technology, the 83-megawatt pressurised water reactor has a short refuelling cycle, thus limiting the length of the Arihant's deterrent patrols.

In short, in order to enjoy an effective sea-based deterrent with regard to China, India will need to deploy larger SSBNs with greater missile carriage

capacity and more powerful nuclear reactors. The fourth planned submarine in the series is projected to possess such characteristics, but it may take more than a decade for it to be successfully developed and launched, and even longer for it to be commissioned. While India's submarine fleet has been taking shape, Delhi has also conducted a series of test firings, starting in 2000, of Dhanush-class short-range ballistic missiles from surface ships. For the time being, however, it appears that the Dhanush programme is merely a stopgap measure until the SSBN fleet comes into full fruition.

Second, history has shown that all newly nuclear navies face some difficult tradeoffs. As India's SSBN fleet gradually grows in size and importance, the challenge will be to ensure that the navy's new nuclear role develops alongside, rather than to the detriment of, its conventional missions. As in all nuclear navies, a debate will no doubt unfold within the service as to how many resources and platforms should be devoted to the ballistic missile submarine fleet's protection. Tough decisions may need to be made, particularly if India's underwater environment becomes more contested. India's nuclear command and control procedures will also almost certainly undergo a revision, as the SLBMs will be canisterised and ready for launch, rather than de-mated.

Finally, India's naval and nuclear planners will also have to contend with the progressive materialisation of a nuclearised Pakistani navy – albeit one with much less orthodox characteristics and undergirded by a very different nuclear posture. Indeed, Islamabad aims to eventually disperse nuclear-tipped cruise missiles across a variety of naval platforms, ranging from surface ships in the short

term to conventional diesel-electric submarines in the long term.

Unlike India, Pakistan's naval nuclear ambitions are fuelled primarily by the sense of a growing conventional imbalance in the maritime domain. By nuclearising – or by appearing to nuclearise – a large portion of their fleet architecture, Pakistani military planners hope to neuter India's growing naval power, inject ambiguity and acquire escalation dominance in the event of a limited conflict at sea. Since Independence, Indian naval officers have been accustomed to operating within a purely conventional maritime setting. Dealing with such a prospective

adversary will no doubt necessitate a fundamental rethinking of the navy's operational concepts. Perhaps more importantly, it will also require an effort on the part of both countries to further institutionalise the maritime component of their relations so as to ensure that in future, isolated incidents don't spiral out of control.

*Source: The writer, a nonresident fellow in the South Asia Programme at the Atlantic Council. The Indian Express, 19 March 2015.*

**OPINION – Mathew R. Costlow**

**The Costs of Nuclear Disarmament**

Nuclear disarmament advocates are having a tough year so far. President Obama, who they thought would aggressively pursue nuclear reductions, is presenting a modernization plan for the three legs of the US nuclear triad, nuclear bombers, sea-launched and land-based missiles. Outgoing Secretary of Defense Chuck Hagel, who endorsed the goal of nuclear disarmament before coming to the Pentagon, has since repeatedly affirmed US

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nuclear modernization as the DoD "highest priority mission." Russia's nuclear threats against NATO allies and China's development of a new ICBM with multiple warheads have undermined nuclear disarmers' assurances that further deep US nuclear reductions would be prudent.

The final hope nuclear disarmers have is to convince the American people that the Obama administration's nuclear modernization plans are "unaffordable and unsustainable."

Sen. Ed Markey and Rep. Earl Blumenauer hold similar views as they recently proposed the SANE Act, which they believe would save \$100 billion over the next decade by cutting US nuclear forces. They support this claim by citing reports like the National Defense Panel which estimated the cost of modernization to be between \$600 billion and \$1 trillion over the next thirty years, averaging about \$20-\$33 billion per year.

What nuclear disarmers fail to mention, however, is that spending on nuclear weapons in the defense budget has been essentially flat for the past two decades, its lowest point in over 50 years. As the Pentagon's former top weapons procurement official, Secretary of Defense Ashton Carter knows well that nuclear weapons and their supporting systems cost about \$16 billion per year, or only three percent of the annual defense budget. Spending only three percent on the nuclear arsenal is historically below average; and modernization plans would just bring expenses to their historical norm.

Nuclear disarmers claim that cutting the number of nuclear weapons and delivery systems will save the taxpayer a lot of money, but as Secretary Carter has said, nuclear reductions are "not the answer to our budget problem. They're just not that expensive." In fact, the policy of nuclear

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disarmament may end up costing the United States more in the long run than if it continues current modernization plans. US nuclear weapons play a very important and cost-effective role in the current strategic environment by assuring our NATO allies in the face of Russian aggression and permitting allies such as South Korea and Japan, who fear Chinese and North Korean threats, to remain

non-nuclear.

Cutting the US nuclear arsenal further would likely embolden Russia and China, damage relations with allies, and drive allies to examine obtaining nuclear weapons themselves. These are costly possibilities indeed. Also, the nuclear delivery systems we are investing in retain enormous value as a hedge against an uncertain and unknowable future. Some of the systems the United States is developing will be expected to operate effectively into the 2080s, 65 years from now. By claiming that the United States should make further deep and "irreversible" cuts in the US nuclear arsenal, nuclear disarmers show they are willing to hamstring US capabilities for decades on the assumption of a benign future they cannot possibly foresee accurately.

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Threats against the United States change frequently both in scope and severity, and often unexpectedly. If the United States were to make further deep cuts, it could be ill-equipped at best when new threats emerge. Modifying existing nuclear systems to meet new threats would take a good deal of time and be enormously expensive. If modifying existing systems proves unworkable, purchasing whole new systems rapidly as a supplement to meet a future threat would likely be infeasible or, again,

extremely costly. As anyone in the defense acquisition business knows, timelines of major defense projects are often measured not in years, but in decades.

Unfortunately world events often unfold much faster than the defence community can anticipate or plan for. As such, it is prudent for the United States to invest in nuclear capabilities that are flexible and resilient in a fluid threat environment. That is precisely what the administration is requesting. This is where the greatest value of a modernized US nuclear arsenal lies. It would adapt as necessary to shifting threats. And if built with an eye toward the future, US nuclear forces may be able to integrate the new technology that will inevitably arrive in the next 65 years.

By continuing to invest in nuclear weapons and their delivery systems, the United States is demonstrating a clear understanding of the value they provide in both deterring enemies and assuring allies in an unpredictable, dangerous world. In a time of restricted budgets and scarce resources, Congress should prioritize those programs that provide the greatest value in the defense of the United States against the most serious threats, now and in the future. A modernized US nuclear arsenal meets those requirements and is worth the very small portion of the Defense budget required.

*Source: Costlow is a policy analyst at the National Institute for Public Policy in Fairfax, Virginia. <http://thehill.com>, 26 March 2015.*

**OPINION – Karl Vick**

**The Middle East Nuclear Race Is Already Under Way**

While the US and other world powers work to constrain Iran's nuclear program, five rival nations plan atomic programs. One of the most important reasons why the US is trying to conclude a nuclear deal with Iran is to prevent an Iranian bomb from triggering a nuclear race in the Middle East. Yet even as talks continue now in Switzerland,

Tehran's regional rivals have already begun quietly acting on their own atomic ambitions. Nuclear power may be on the wane almost everywhere else in the world, but it's all the rage in the place with all that oil.

Egypt's announcement February 2015 that it was hiring Russia to build a reactor near Alexandria made it only the latest entrant in an emerging atomic derby. Every other major Sunni power in the region has announced similar plans. And though none appear either as ambitious nor as ambiguous as what's taken place in Iran – which set out to master the entire atomic-fuel cycle, a red flag for a military program – each announcement lays down a marker in a region that, until recently, was notable as the one place on the planet where governments had made little progress on nuclear power.

With the exception of Israel, which has never publicly acknowledged its widely known nuclear arsenal, no Middle Eastern country beyond Iran had a nuclear program – peaceful or otherwise – until the wealthy UAE began building a reactor in July 2012. The list now includes,

in addition to Egypt, Turkey, Jordan and Saudi Arabia – the last Iran's archrival, and which 2014 revealed plans to build 16 nuclear plants over the next two decades. When the President of South Korea – which has 23 nuclear plants of its own – visited the Kingdom earlier in March, leaders of both countries signed a memo of understanding calling for Seoul to build two of the nuclear plants. The Saudis have made similar arrangements with China, Argentina and France.

"It's not just because nuclear power is seen as a first step toward a nuclear-weapons option," says Mark Fitzpatrick, a former US State Department nuclear expert who now runs the nonproliferation and disarmament program at London's International Institute for Strategic Studies. "There is also a prestige factor: keeping up with the neighbors." Middle Eastern nations may have legitimate reasons to invest in nuclear energy. Jordan, for instance, has almost no oil in liquid form, and almost less water. Saudi Arabia and the

**Middle Eastern nations may have legitimate reasons to invest in nuclear energy. Jordan, for instance, has almost no oil in liquid form, and almost less water. Saudi Arabia and the UAE possess huge crude reserves, but lose potential export revenue when they burn oil at home to create electricity – huge amounts of which are sucked up by desalination plants.**

UAE possess huge crude reserves, but lose potential export revenue when they burn oil at home to create electricity – huge amounts of which are sucked up by desalination plants. Turkey, despite impressive hydroelectric potential, must import oil and natural gas.

But all that has been true for decades. What's changed in recent years is the nuclear capabilities of Iran – a Shi'ite Muslim country Sunni leaders have come to regard as major threat. Jordan's King Abdullah II famously warned of a "Shia crescent" of Iran-aligned countries reaching from the Mediterranean to the Persian Gulf. The Saudis have made it clear that they will acquire a nuclear weapon should Iran get one.

"This is not the shortest way to a nuclear weapon, by any means," says Sharon Squassoni, director of the proliferation-prevention program at the Center for Strategic and International Studies in Washington, D.C. "But if I put myself in their shoes, I'd think it probably makes sense to start down this path to see if we can develop a civilian nuclear [program], and if we pick up some capabilities along the way, that's all right."

Suspicion rises with every new announcement partly because the Middle East is bucking a global trend. Worldwide, the number of nuclear plants has declined since the meltdown at Japan's Fukushima Daiichi plant in 2011. Reactions differed by country. Germany forswore nuclear energy altogether after the disaster, while China pressed ahead, planning more than 100 new reactors. But in most places, the environmental risks and high costs have turned countries off nuclear power.

"My beef with nuclear energy is that it's sort of held up as this very prestigious thing," Squassoni tells TIME. "We do nuclear deals with our best allies ... all this stuff about strategic partnership. And really, it's this extremely expensive, complicated, slightly dangerous way to boil water. And that's what you're doing, right? You're boiling water to turn those turbines."

The expense alone may prevent some Middle Eastern nations from every actually joining the "nuclear club." Building an atomic plant costs at

least \$5 billion, Fitzpatrick notes, and Egypt is desperately poor; Jordan relies heavily on remittances and foreign aid. But the Saudis still have money to burn and, according to former White House official Gary Samore, have consistently rebuffed US imprecations to sign a pledge not to divert any nuclear program toward producing a bomb. Saudi Arabia *has* signed the NPT, but then so has Iran, and in the end a race can be run by as few as two: India and Pakistan, bitter neighbors, neither of which are rich, went nuclear in 1974 and 1998, respectively. They've gone to war once since, raising anxiety levels around the world.

So the talks in Switzerland are about more than preventing Iran from getting the bomb. They are also about persuading Iran's neighbors that the nuclear option is effectively off the table. If the talks end with a final agreement that looks like a win for the Islamic Republic, diplomats say its neighbors will fast track their own plans. "If the accord is not sufficiently solid then regional countries would say it's not serious enough, so we are also going to get the nuclear weapon," French Foreign Minister Laurent Fabius told Europe 1 Radio. "And that would lead to an extremely dangerous nuclear proliferation."

Source: <http://time.com/3751676/iran-talks-nuclear-race-middle-east/>, 23 March 2015.

**OPINION – Thomas L. Friedman**

**US Should Look Before Leaping into Iran Nuclear Deal**

I can think of just as many reasons not to. So, if you're confused, let me see if I can confuse you even more. The proposed deal to lift sanctions on Iran – in return for curbs on its bomb-making capabilities so that it would take at least a year for Teheran to make a weapon - has to be judged in its own right. I will be looking closely at the quality of the verification regime and the specificity of what happens if Iran cheats. But the deal also has to be judged in terms of how it fits with wider American strategic goals in the region, because a US-Iran deal would be an earthquake that touches every corner of the Middle East. Not enough attention is being paid to the regional implications –

particularly what happens if the US were to strengthen Iran at a time when large parts of the Sunni Arab world are in meltdown.

The Obama team's best argument for doing this deal with Iran is that, in time, it could be "transformational". That is, the ending of sanctions could open Iran to the world and bring in enough fresh air - Iran has been deliberately isolated since 1979 by its ayatollahs and RGC - to gradually move Iran from being a revolutionary state to a normal one, and one less inclined to threaten Israel. If one assumes that Iran already has the know-how and tools to build a nuclear weapon, changing the character of its regime is the only way it becomes less threatening.

The challenge to this argument, explains Mr Karim Sadjadpour, a Middle East specialist at the Carnegie Endowment, is that while the Obama team wants to believe this deal could be "transformational", Iran's supreme leader Ali Khamenei "sees it as transactional" - Iran plugs its nose, does the deal, regains its strength and doubles-down on its longstanding revolutionary principles. But, then again, you never know. What starts out as transactional can end up being transformational in ways that no one can prevent or predict.

A second argument is that Iran is a real country and civilisation, with competitive (if restricted) elections, educated women and a powerful military. Patching up the relationship could enable America to better manage and balance the Sunni Arab Taleban in Afghanistan, and counterbalance the Sunni jihadis, like those in the ISIS, now controlling chunks of both countries. The United States has relied heavily on Saudi Arabia ever since Iran's 1979 revolution, and while the Saudi ruling family and elites are aligned with America, there is a Saudi Wahhabi hard core that has funded the spread of the most puritanical, anti-pluralistic, anti-

women form of Islam that has changed the character of Arab Islam and helped to foster mutations like ISIS. There were no Iranians involved in the Sept 11, 2001 attacks.

Then again, it was Iranian agents who made the most lethal improvised explosives in Iraq that killed many American troops there. And it was Iran that encouraged its Iraqi Shi'ite allies to reject any extended US military presence in Iraq and to also overplay their hand in stripping power from Iraqi Sunnis, which is what helped to produce the ISIS counter reaction. "In the fight against ISIS, Iran is both the arsonist and the fire brigade," added Mr Sadjadpour. To Saudi Arabia, he added, the rise of ISIS is attributable to the repression of Sunnis in Syria and Iraq by Iran and its Shi'ite clients. To Teheran, the rise of ISIS is attributable to the financial and ideological support of Saudi Arabia and its Gulf allies.

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And they are both right, which is why US interests lie not with either the Saudis or the Iranian ideologues winning, but rather with balancing the two against each other until they get exhausted enough to stop prosecuting their ancient Shi'ite-Sunni, Persian-Arab feud. Then again, if this

nuclear deal with Iran is finalised, and sanctions lifted, much more Iranian oil will hit the global market, suppressing prices and benefiting global consumers. Then again, Iran would have billions of dollars more to spend on cyberwarfare, long-range ballistic missiles and projecting power across the Arab world, where its proxies already dominate four Arab capitals: Beirut, Baghdad, Damascus and Sanaa.

But, given the disarray in Yemen, Iraq and Syria, do we really care if Iran tries to play policeman there and is embroiled in endless struggles with Sunni militias? For 10 years, it was America that was overstretched across Iraq and Afghanistan. Now it will be Iran's turn. I feel terrible for the people who have to live in these places, and the

US should certainly use air power to help prevent the chaos from spreading to islands of decency like Jordan, Lebanon and Kurdistan in Iraq. But managing the decline of the Arab state system is not a problem America should own. We've amply proved that we don't know how.

So before you make up your mind on the Iran deal, ask how it affects Israel, the country most threatened by Iran. But also ask how it fits into a wider US strategy aimed at quelling tensions in the Middle East with the least US involvement necessary and the lowest oil prices possible.

Source: <http://www.straitstimes.com>, 26 March 2015.

**OPINION – Ali Ahmad**

**Tehran May Benefit from A Nuclear Freeze**

As the talks over Iran's nuclear program appear to be converging toward reaching a long-term comprehensive agreement, hints have emerged that Iran may be asked to cap its uranium enrichment capacity for a certain period of time. Although this is demanded by the United States, suspension

of uranium enrichment program actually offers a valuable opportunity for Iran. It gives the Islamic Republic much-needed breathing space to strategize the country's energy policy for the coming decades.

Iran's current enrichment capacity stands at 22,000 centrifuges, installed at the Natanz and Fordow facilities, out of which about 10,000 are currently operating. Current estimates of Iran's breakout time to develop a nuclear weapon, if it chooses to do so, range between 6 to 12 months. The United States believes that it can detect and prevent any clandestine attempt by Iran to make a nuclear weapon within such a timeframe.

Why is Iran keen to expand its uranium enrichment capacity? The answer lies in its need to secure fuel supply for its operating power and research

reactors, and for reactors it intends to build in the future. Currently, Iran relies on Russia to obtain enriched uranium fuel under an agreement that will expire in 2021. If Iran wants to meet its practical needs of enriched uranium fuel by producing it domestically, it would require a massive expansion of its enrichment program in a short period of time. There are, however, multiple economic and policy disincentives to embark on such a project now.

A Princeton University study, authored by Alexander Glaser, Zia Mian, Hossein Mousavian and Frank von Hippel, argued that relying on the current IR-1 centrifuge technology to produce nuclear fuel domestically is both inefficient and ultimately uneconomic. The IR-1 technology is much less advanced than the commercially deployed technology. Any further

investment in the IR-1 technology would simply be pouring money down the drain. Providing fuel for the Bushehr reactor, the only operating nuclear power reactor in Iran and the Middle East, alone would require about 100,000 IR-1 centrifuges, roughly 10 times what Iran currently operates.

Therefore, shifting toward a more advanced centrifuge technology appears to be a logical option. Consequently, having the right to continue research and development activities in this field is an issue of particular importance for Iran.

If the nuclear deal with Iran indeed includes freezing enrichment capacity, it is not yet clear for how long this would hold. Sources close to the negotiations talk about a time period of 10 years. If true, this would allow Iran to study its nuclear power plans more carefully while working on advancing its centrifuge technology. The next decade will define the future of nuclear power. While some industry insiders talk about signs of recovery following the multiple accidents at the Fukushima Daiichi power plant in Japan, poor economic competitiveness makes it really hard to imagine a flourishing nuclear future.

**Iran's current enrichment capacity stands at 22,000 centrifuges, installed at the Natanz and Fordow facilities, out of which about 10,000 are currently operating. Current estimates of Iran's breakout time to develop a nuclear weapon, if it chooses to do so, range between 6 to 12 months.**

The continued low prices of natural gas, dramatic decline in costs of solar power and the increased ability to integrate intermittent energy resources into electricity grids provide an appealing policy choice to abandon nuclear power. The Islamic Republic holds one of the largest reserves of natural gas in the world and enjoys a geographic advantage of high exposure to sunshine. Moreover, uncertainty over oil revenues, especially when experts signal a persistence in low oil prices, makes it hard for Iran to commit toward a massive expansion of nuclear new build at the moment. Sustaining a fully indigenous nuclear program and constructing many nuclear power reactors requires substantial investments. Financing such plans may prove challenging, even for a resource-rich country such as Iran.

A partial nuclear freeze would also strengthen Iran's human resources. It allows for time to continue developing a highly skilled workforce. An agreement would likely come with a high level of technical cooperation between Iran and world powers on the one hand and between Iran and the IAEA on the other. Iranian scientists would be able to benefit from sharing knowledge and expertise with fellow scientists from all over the world. They would find it easier to publish their scientific research and be able to attend conferences and meetings without worrying about being denied entry.

The counter argument is that Iran has already invested billions of dollars in developing its nuclear program and sacrificed some of its best scientific minds along the way. Indeed, Iran has paid a very high price to sustain its nuclear ambitions and abandoning its nuclear project may have hefty political costs. However, Iran must not rush into

embracing nuclear power. At least there is no urgent need to do so right now.

Source: <http://www.dailystar.com.lb>, 20 March 2015.

## **NUCLEAR STRATEGY**

### **INDIA**

#### **Russia Ready to Lease a Second Nuclear Submarine to India**

Russia is ready to lease a second Project 971 Shchuka-B submarine to India for a period of ten years, a source in the shipbuilding industry told Interfax-AVN. The decision has been made on leasing a second nuclear submarine, remarked the source. That may be K-322 Kashalot or another submarine of the Chakra class, he said. The submarine will require profound modernization consistent with wishes of the foreign customer.

The submarine will be customized by the Amur shipyards. Modernization and testing of the submarine and training of the Indian crew will take three years. The Kashalot will be transferred to the Indian Navy in 2018, the source noted. Russian shipyards prepared a Project 971 Nerpa nuclear-powered submarine for transfer to the Indian Navy in an earlier period. That submarine was leased for ten years at a price of \$980 million. The acceptance document was signed in December 2011 and the submarine named the Chakra joined the Indian Navy on April 4, 2012.

The fact that India was considering the possibility of renting another Project 971 submarine came to light in December 2014. That is when the Indian Defense Minister Manohar Parrikar said that his ministry was considering two options: the

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extension of the lease on the Chakra K-152 "Nepra" Class Project 971 submarine or renting a second ship of this project – the "Shchuka-B". The Kashalot submarine of Project 971 Shchuka-B belongs to the third generation. The submarine has a submerged displacement of 12,770 tonnes, a submerged speed of 30 knots, a depth capability of 600 meters, sea endurance of 100 days and a crew of 73 men.

Source: *Russia & India Report*, 27 March 2015.

## ISRAEL

### Revealing Israel's Nuclear Secrets: The Pentagon Declassifies A Surprising 1987 Report

In early February, the Pentagon declassified a 386-page report from 1987, exposing for the first time ever the actual depth of top-secret military cooperation between the United States and Israel

– including, amazingly, information about Israel's unacknowledged nuclear program. In view of the caustic tension that has increased lately between Washington and Jerusalem, the timing of the publication's declassification, after a long legal process, might raise a few eyebrows. I have some knowledge about the build-up

process of Israel's nuclear capacity and after reading the report in question I must express my astonishment: I have never seen an official American document disclosing such extensive revelation on subjects that until now were regarded by both administrations as unspeakable secrets.

The report – titled "Critical Technological Assessment in Israel and NATO Nations" – describes in detail the march of Israeli military and technological advancement in the 1970s and 80s. The authors drew particular attention to the development and progression of Israel's nuclear infrastructure and research labs. The most surprising segment in the report states that the Israelis are "developing the kind of codes which

will enable them to make hydrogen bombs. That is, codes which detail fission and fusion processes on a microscopic and macroscopic level." In practice, this short expression confirms that in the eighties, Israeli scientists were reaching the capabilities to employ hydrogen fusion, possible creating the sort of bombs that are thought to be a thousand times more powerful than atom bombs.

It should be emphasized that in the history of the relations between the two countries, there is no other published official American document that mentions in any way the Israelis development of hydrogen bombs. Moreover, the report proclaims that the labs in Israel "are equivalent to our Los Alamos, Lawrence Livermore and Oak Ridge National Laboratories." Needless to say, all three of these laboratories were the principal creators of American nuclear capability. Israel's facilities,

the report reveals, are "an almost exact parallel of the capability currently existing at our National Laboratories". With all these revelations, the report is not directly stating that Israel has developed either an A-bomb or an H-Bomb, but the hints are not hidden. "As far as nuclear technology is concerned," the report proclaims," the Israelis

are roughly where the US was in the fission weapon field in about 1955 to 1960." The first American thermonuclear bomb was tested in 1952. Hence, a conclusion that previous to the second half of the eighties, Israel had obtained nuclear technologies that make building an H-Bomb possible is within the realm of the possible.

... In some scientific spheres, the IDA report claims, Israeli physicists were at that time some steps ahead of the Americans. Several times in the text the report mentions the "ingeniously clever" solutions that Israeli physicists had found for complicated problems. Some of these "ingenious Israeli inventions" are ascribed in the report to the scientists of Rafael (Hebrew's acronym of "Authority for the Development of

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Armaments'), which is "a key research and development laboratory in Israel." Still, the report asserts that the Israeli scientists were "junior partners," who preset "technology based on extrapolations of US equipment and ideas." How Israeli scientists could be "partners," who obtain nuclear technologies that were produced in the States? On this subject the report remains silent.

Source: Michael Karpin is an Israeli journalist and writer. <http://forward.com>, 25 March 2015.

## **PAKISTAN**

### **Pakistan Needs Short-Range Nuclear Weapons to Deter India: Expert**

Pakistan needs short-range "tactical" nuclear weapons to deter arch-rival India, a top adviser to its government has said, dismissing concerns it could increase the risk of a nuclear war. Khalid Kidwai also rejected concerns over the security of Pakistan's nuclear arsenal, insisting that adequate safeguards are in place to protect what analysts have described as the world's fastest-growing atomic arsenal. Pakistan's development of smaller warheads built for use on battlefields, in addition to longer-range weapons, has increased international concerns that they could get into rogue hands because of the pervasive threat of Islamic militants in the country.

Pakistan and its larger neighbor India have fought three wars. They have held on-off peace talks over the years but are involved in a nuclear and missile arms race that shows no sign of abating. Neither side discloses the size of its arsenal. But a recent report by the Council on Foreign Relations think tank estimated that Pakistan has enough fissile material to produce between 110 and 120 nuclear weapons, and India enough for 90 to 110 weapons. For 15 years, Kidwai led the administration of Pakistan's nuclear and missile

weapons program. He now serves as an adviser to the National Command Authority, a committee of the top civilian and military leaders that sets the country's nuclear weapons policy.

He spoke at a conference on nuclear security organised by the Carnegie Endowment for International Peace in Washington. ... Kidwai said nuclear deterrence had helped prevent war in South Asia. He said Pakistan's development of tactical weapons – in the form of the Nasr missile, which has a 60-kilometer range – was in response to concerns that India's larger military could still wage a conventional war against the country, thinking Pakistan would not risk retaliation with a bigger nuclear weapon.

Source: <http://economictimes.indiatimes.com>, 24 March 2015.

### **Shaheen-3 Missile to Cover Indian Second Strike from Andaman: Khalid Kidwai**

Pakistan has developed the 2,750 km range Shaheen-3 missile to prevent India from gaining a second-strike nuclear capability from Andaman and Nicobar islands, said Lt General (ret'd) Khalid Kidwai, former head of Pakistan's nuclear weapons division. Addressing the Carnegie International Nuclear Policy

Conference 2015 in Washington DC, Kidwai said one sided policies of the United States favouring India – like the NSG exemption for the nuclear deal – have been a destabilizing factor for South Asia. These US policies are unhelpful and unacceptable to Pakistan, he said.

... Kidwai said that Pakistan's nuclear program isn't open-ended and it has been designed to deter India. In response to a question on the number of nuclear bombs that will be enough for Pakistan, he refused to divulge the exact numbers by suggesting that Pakistan follows the policy of nuclear ambiguity and revealing numbers would

**Kidwai said nuclear deterrence had helped prevent war in South Asia. He said Pakistan's development of tactical weapons – in the form of the Nasr missile, which has a 60-kilometer range – was in response to concerns that India's larger military could still wage a conventional war against the country, thinking Pakistan would not risk retaliation with a bigger nuclear weapon.**

be against it. Kidwai added that Pakistan had already moved from minimum deterrence to full spectrum deterrence and the current numbers will be more or less fine for the next 10-15 years. As per the estimates of Arms Control Association, Pakistan currently has between 100 to 120 nuclear warheads as compared to India's 90-110 warheads.

Kidwai said that nuclear buildup in South Asia "has made war as an instrument of policy almost unthinkable." He also defended Pakistan's quest for Nasr shoot-and-scoot missile system by arguing that introducing a variety of tactical nuclear weapons has deterred India's conventional capability. He said that Pakistan had developed these weapons in response to India's Cold Start strategy. As these tactical nuclear weapons are mounted on short distance missiles, their command and control is delegated to lower levels in the military. This delegation, with lesser checks and balances, raises concerns about the safety and security of the nuclear warheads.

Kidwai revealed that operation control of nuclear weapons is with the SPD and NCA although some day to day delegation has been made to the three defence services. Kidwai questioned that when the Indian space program with ICBM potential doesn't trouble anybody, why does the development of a Shaheen-3 missile by Pakistan bother everyone. "Why aren't India's nukes and missiles troublesome?" he asked. Kidwai also revealed that Pakistan's sea-based second strike capability is a "work in progress" and will come into play in the next few years. Ruling out nuclear submarines for Pakistan, he said "I won't say nuclear submarines, but if broadly talking about a second-strike capability for which submarines are a platform, yes." ...

Source: *The Indian Express*, 24 March 2015.

## BALLISTIC MISSILES DEFENCE

### RUSSIA

#### Russia Warns Denmark of Nuclear Threat if it Joins Nato Missile Defence Shield

Russia has warned Denmark of a nuclear strike on its warships if the Scandinavian country joins Nato's missile defence shield. The Russian ambassador to Denmark Mikhail Vanin issued the dramatic threat in an opinion piece published in the Danish daily newspaper *Jyllands-Posten*. Vanin wrote that Denmark had not comprehended the consequences of joining the Western alliance, arguing the country would become a "threat to Russia".

The ambassador wrote:

I do not think that the Danes fully understand the consequences if Denmark joins the US-led missile defence shield. If that happens, Danish warships become targets for Russian nuclear missiles. Denmark will be part of the threat to Russia. Denmark's foreign minister Martin Lidegaard responded to the comments by labelling the comments as "obviously unacceptable": Russia knows full well that Nato's missile defence is not aimed at them. We are in disagreement with Russia on a number of important things but it is important that the tone between us does not escalate.

Nato's missile defence aims to protect Allied populations, territory and forces from ballistic missiles. Denmark wants to place radar on its frigate ships that would allow it be part of the missile shield. In 2014, Denmark's defence minister Nicolai Wammen said the move should not be seen as "targeted against Russia, but rather to protect us against rogue states, terrorist organisations and others that have the capacity to fire missiles at Europe and the US."

Tensions with Russia in the Baltic and Scandinavian regions have heightened in recent months, amid

**Russia has warned Denmark of a nuclear strike on its warships if the Scandinavian country joins Nato's missile defence shield. The Russian ambassador to Denmark Mikhail Vanin issued the dramatic threat in an opinion piece published in the Danish daily.**

fears of another Ukraine-style annexation and Russian intrusion into Estonia, Finland and Sweden airspace. RAF Typhoons intercepted two Russian bombers flying over the North Sea in November 2014 while a foreign military submarine – believed to belong to Russia - was confirmed to have entered Swedish waters.

Source: <http://www.cityam.com>, 22 March 2015.

## **USA**

### **Pentagon Plans Hard Look at Missile Defence Programs**

The US Defence Department has launched a major review of missile defence programs and capabilities, after military commanders called the current strategy “unsustainable” given tough budget pressures and rising threats around the world. Former Defence Secretary Chuck Hagel described the review in a Feb. 4 memo to top officers in the US Army and Navy, a copy of which was obtained by Reuters. In 2015’s review would also cover regional ballistic missile defence issues, the global reach of the US Patriot missile defence system, and US power projection capabilities.

Hagel said a strategic review by top Pentagon officials last fall had concluded the current ballistic missile defence policy was sound, but recommended an update of a 2011 joint study to help shape the Pentagon’s fiscal 2017 budget process. Chief of Naval Operations Admiral Jonathan Greenert and Army Chief of Staff General Ray Odierno, in a memo dated Nov. 5, had called for a reassessment by the Pentagon.

The Pentagon’s current focus on forward-deployment of assets was too costly, they wrote, urging a shift to a more holistic approach that included use of non-kinetic “left of launch” technologies such as electromagnetic propagation

**The Pentagon’s current focus on forward-deployment of assets was too costly, they wrote, urging a shift to a more holistic approach that included use of non-kinetic “left of launch” technologies such as electromagnetic propagation and cyber.**

and cyber. They said it was critical to develop a more cost-effective and sustainable long-term approach that addressed homeland missile defence and regional missile defence priorities. In his response, Hagel said the department would

continue to look for “innovative” ways to address challenges, and urged Greenert and Odierno to play an active role in the various reviews. ...

Source: <http://news.asiaone.com>, 18 March 2015.

### **US Ballistic Missile Defense Costs Rise Nearly 6 Percent**

Program costs for the Ballistic Missile Defense System increased by 5.9 percent to a total of nearly \$140 billion, according to a US DoD acquisition report released on 19 March. “Program costs increased \$1,238.5 million from \$138,599.3 million to \$139,837.8 million,” the report stated. The increases were primarily due to additional funding for GBMD reliability

improvements, an adjustment for current and prior escalation, refined cost estimates and methodology changes as well as Congressional “plus ups” for various programs, according to the report.

The increases, however, were partially offset by a reduction in THAAD

interceptors, Aegis realignment and a delay in Ground-Based Interceptor procurement. The US-designed ballistic missile defense system was approved in 2010, during a NATO summit in Lisbon. A range of European countries, including Poland, Romania, Spain and Turkey agreed to deploy elements of this system on their territories. GBMD is located in Alaska and California, while some US officials are advocating for a third location in the Eastern

**Range of European countries, including Poland, Romania, Spain and Turkey agreed to deploy elements of this system on their territories. GBMD is located in Alaska and California, while some US officials are advocating for a third location in the Eastern United States.**

United States. The GBMD program has been beset by a number of setbacks in testing.

The sea-based Aegis system has been much more successful in testing, while the Patriot system has been used in combat defenses. In December, Russian President Vladimir Putin said Washington created threats for Russia by expanding its missile defense shield, placing its elements in Eastern Europe, close to the Russian border. However, NATO claims the system is primarily aimed to protect its allies, countering threats from North Korea and Iran.

*Source: <http://sputniknews.com>, 19 March 2015.*

## **NUCLEAR ENERGY**

### **INDIA**

**Accelerating Use of Nuclear, Solar Energy Key for India's Growth: Anil Kakodkar**

Former Atomic Energy Commission chairman Anil Kakodkar said that for enhancing economic growth, India must accelerate its efforts to harness solar and nuclear energy while pursuing environmentally friendly policies. "While we pursue environmentally benign policies, how do we enhance our GDP? If we want to do that, I have been convinced for some time, we must accelerate solar and nuclear energy in the Indian context," he said while during a panel discussion on 'Climate Risk and Security' organised by the CEEW.

He said that in the coming decades, action should be taken to ensure rapid growth of GDP while following sound environmental policies. "There should also be rapid development in science and technology solutions to a variety of things. Not just in terms of adoption or mitigation, but addressing the global warming problem itself," he said. Noting that despite ongoing talks about various geo- engineering solutions, there were apprehensions about their uncertainties and risks, he said it is important that definitive answers in terms of solutions are found in the next few decades not with significant uncertainties attached but in a manner where these can be implemented without too much risk.

"It is essential there is global effort and ability to

find such solutions but there should be global understanding. Everybody should be convinced that implementing such solutions is risk free," he said. Noting that climate risk is important to understand for countries like India, where both developmental deficits and aspirations are very large, he said that the country must aim to accelerate its development, which would in turn increase its ability to mitigate and adapt to climate change better. "India is the largest part of the world civilisation with maximum developmental deficit... (be it) in terms of energy or any other parameter," he said. Noting that the climate issue is global and one has to worry about rising seas, floods, shrinking landmass and migration, he said that all of it calls urgently for united action.

*Source: <http://articles.economictimes.indiatimes.com>, 20 March 2015.*

**Mithivirdi Nuclear Plant Gets Coastal Regulatory Zone Nod**

The 6,000-MW Mithivirdi Nuclear Power Plant in Bhavnagar district has got coastal regulatory zone (CRZ) nod from the Union Ministry of Environment, Forests & Climate Change (MoEFCC). The clearance for setting up of "intake and outfall facility" for the 6,000-MW plant at Mithivirdi, about 40 kms from Bhavnagar, is seen as a big boost for NPCIL that has been facing severe opposition from local farmers and social activists.

"We will be creating a structure for the intake of sea water for cooling purpose at the nuclear plant. We will create a deep-sea discharge facility of about 2.5 to 3.5 kms in the sea," said a senior NPCIL official while talking to The Indian Express about the Mithivirdi project.

The clearance has been granted for constructing an intake channel that will be 100 metre wide and 10 metre deep and a discharge facility comprising of Condenser Cooling Water Discharge tunnels of eight-metre diameter and six kms in length (for two units) and a total of 18 kms (for units). It is also proposed to construct a small barge handling marine facility having a draft of 3-4 metres for receiving and handling over dimensional

consignments (ODCs) during the construction stage. It will be in the form of a shore-based wharf type or an open-piled jetty system.

The project had been recommended by the Gujarat Coastal Zone Management Authority on January 13 last year. "It shall be ensured that there is no displacement of the people, houses or fishing activity as a result of the project," the ministry stated while laying down specific conditions granting the clearance. The ministry has also asked the company to examine possibilities of deploying ultrasonic devices to divert the aquatic life from entering into the sea water intake in connection with National Institute of Ocean Technology (NIOT). It has also asked filters to be provided at intake to prevent entry of marine life along with the sea water. However, NPCIL is yet to acquire land for the project. ...

*Source: The Indian Express, 26 March 2015.*

## **URANIUM PRODUCTION**

### **NAMIBIA**

#### **Namibia Commissions Demonstration Uranium Plant**

Construction work began on the plant in October 2014 and it is expected to deliver its first test results by the end of June. The plant will demonstrate the design and projected performance in the definitive feasibility study for the project, as well as building knowledge and enabling the company to pursue value engineering ahead of full production. Etango is 30 km southwest of Rio Tinto's operating Rössing uranium mine and has similar alaskite ore to that found at Rössing, with measured and indicated uranium resources of 57,330 tU and inferred resources of 24,600 tU. With much of the resource less than 200 m deep, it is amenable to conventional open pit mining and sulphuric acid heap leaching in what Bannerman describes as a low technical and environmental risk project.

From the definitive feasibility study, Bannerman envisages production of around 2700 -3500 tU per year over the first five years of production and 2300-3100 tU per year thereafter, over a minimum mine life of 16 years. This would place Etango within the world's the top ten uranium mines in terms of production. The heap leach demonstration plant will process ore using four 5 metre-high cribs to process individual 40 tonne ore samples as well as simulating the planned heap leach pad operation by circulating the leached solution between the cribs. A 3000 tonne sample of ore has been taken from the

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Onkelo region of the deposit. Crushed and blended to represent the assumed ore feed in the final operation, it will enable up to three years of testing to be carried out.

Bannerman holds 80% of the Etango project and has long been seeking a development partner. A 2011 takeover offer from China's Sichuan Hanlong group did not proceed, and a 2012 agreement that would have seen Namibian state-owned Epangelo Mining Ltd buy a 5% stake in the project was also called off. As well as proving the technology for the mine, the demonstration plant will also demonstrate the viability of the operation to potential investors and financiers. Bannerman chief executive officer Len Jubber remarked that the commissioning of the plant had coincided with China's approval of the construction of two new units at Hongyanhe, suggesting that China's nuclear expansion plan signalled a growing demand for uranium. "In the face of this growing demand, [the] Etango Project remains one of the very few globally significant uranium projects that can realistically be brought into production in the medium term," he said.

Environmental approvals for the Etango project are already in place, although a mining licence has not yet been issued. Bannerman's indicative timetable for development does not predict a date for the start-up of the mine but the company has a project schedule drawn up as part of the

definitive feasibility study envisages an engineering and construction period of about 30 months from project approval to plant commissioning.

Source: <http://www.world-nuclear-news.org>, 26 March 2015.

## **U SA**

### **Energy Fuels Diligently Prepares for Uranium Market Turnaround**

In the face of a weak uranium market, US uranium producer Energy Fuels has posted higher 2014 gross profit and a strengthened balance sheet, all while securing a deal to acquire Uranerz Energy to become the largest integrated uranium miner focused in the United States. The company, which reports in US currency, posted its financial results for the year ended December 31, 2014, exiting the year with \$38.6 million of working capital and cash and equivalents of \$10.4 million.

Energy Fuels is America's largest conventional uranium producer, and owns the White Mesa mill, which is the only conventional uranium mill operating in the US and is capable of processing 2,000 tons per day of uranium ore. In light of weak uranium prices, the company is only selling uranium under its long term contracts, and said it has no plans to start any mineral processing campaigns for the remainder of 2015 once its current campaign is finished in the first half of 2015.

The company recently announced plans to acquire Uranerz Energy, which gives Energy Fuels the largest US uranium resource base of any of the US producers as well as scalability to take its existing projects and develop them in the future as uranium prices increase. The deal will create the only integrated conventional and in-situ recovery uranium producer focused solely on the US. In 2014, Energy Fuels produced about 940,000 pounds of uranium from its White Mesa mill under existing term contracts, and Uranerz began uranium production at its Nichols Ranch ISR project. "Now with our proposed acquisition of Uranerz, we are about to emerge as the leading

uranium mining company focused on the United States," said president and chief executive officer, Stephen P. Antony, in a statement. "The timing for this transaction is right, especially with the strengthening of uranium spot prices we saw in the fall of 2014 – a strengthening which has continued into 2015."

The CEO said he believes the long-term fundamentals of uranium remain "as strong as ever", as the world continues to invest heavily in nuclear energy. "Energy Fuels has the staying power, production capability, and project portfolio that should allow us to successfully capitalize on the strong uranium market fundamentals we see in the future," he added.

The company narrowed its net loss substantially in 2014, to \$43.6 million, or \$2.22 per share, compared to the net loss of \$87.3 million, or \$5.61 per share, in the prior 15-month period that ended December 31, 2013. Total revenues fell to \$46.3 million from \$73.2 million. Revenue was almost exclusively from term contract sales of 800,000 pounds of uranium. Energy Fuels said the net loss 2014 was mainly due to non-cash and other items, including impairment assets of \$35.86 million. Gross profit increased markedly, to \$16.0 million from \$5.5 million in 2013, representing a gross profit margin of 35 percent.

Looking ahead, the uranium miner said it will continue to strengthen its position by continuing its current mill campaign to process alternate feed materials into mid-2015. After this, it will continue activities at the White Mesa mill, apart from mineral processing, to maintain the facility for the purpose of restarting operations in 2016. In addition, it is planning to resume development of its high grade Canyon mine in Arizona once its resources at its nearby Pinenut mine are depleted.

The company will also look to conserve its cash until sustained improvement in the uranium market is evident. For now, Energy Fuels has three existing long term contracts, which require deliveries of 800,000 pounds of uranium in fiscal year 2015, with the bulk to come from produced material on hand. Once it completes the pending

acquisition of Uranerz, the combined entity will have six long-term contracts, providing it with downside protection in the event the uranium market does not recover. The longest contract currently in place extends to 2020, and the new company expects to have about 1 million pounds of deliveries in 2015 at about \$58 a pound, approximately 50 percent higher than the current spot price.

Broker Dundee Capital Markets reiterated its buy rating and \$9.00 price target on Energy Fuels, saying the company has laid out a comprehensive strategy of "preparation and preservation", with plans to close the Uranerz deal in the second quarter. "Simply, Energy Fuels is making sure it's ready and able to benefit from a rapid price rise while conserving cash," analyst David A. Talbot said in a research note released to clients earlier 24 March 2015. He noted Dundee's belief that the uranium miner is a leveraged uranium stock, as "higher prices could bring on increased production given its vast pipeline of permitted mines." ...

Uranium prices have been depressed ever since the nuclear disaster in Japan in 2011, but uranium has been a lone bright spot among natural resources, with spot prices having increased about 35 percent in the past six months. This increase is due to new reactors being built in Asia and the expectation that utilities will re-enter the market to cover their fuel needs for 2018 and beyond. Energy Fuels is prepared to pounce on this anticipated resurgence.

Source: <http://www.proactiveinvestors.com.au>, 24 March 2015.

## **NUCLEAR COOPERATION**

### **INDIA-FRANCE**

#### **India, France Work to Fix Jaitapur N-Power Price**

India and France are holding talks to lower the cost of power to finalise a nuclear commerce

agreement between NPCIL and French supplier Areva ahead of Prime Minister Narendra Modi's France visit in April. The two countries signed a pact in 2009 to set up a 9,900 megawatt power project with six European pressurised reactors in Jaitapur, Maharashtra.

Implementation of the controversial project has been held up because of differences over higher prices initially quoted by France and India's stringent nuclear liability law. Officials said talks were being held to bring down the price band to Rs 6.50-7 from the Rs 9-9.50 range initially set by France. Both sides agreed to put final discussions on the liability issue on hold until India's group insurance product is available for suppliers, sources said.

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"We have to make nuclear power viable and affordable to consumers. As far as we are concerned, the unit price should be between Rs 6 and Rs 6.50 or thereabout," said a government official, adding that India has set a target of 63,000MW of

nuclear power by 2032 and that the price of clean energy must not be prohibitive. The DAE benchmark unit price in 2020-21, when the reactors are due to go critical, is Rs 6.50. "The price band of Rs 9 – Rs 9.50 or thereabout cannot be a workable proposition. The price we decide with France will impact negotiations between NPCIL and American suppliers," said another official.

The France-assisted nuclear project is a part of India's efforts to meet its energy needs to drive up economic growth and boost strategic ties. Other technical issues related to the supply of European reactors were also being examined, sources said. The French company has been told to source material from Indian vendors to bring the power unit price down and boost PM Modi's Make in India initiative – since sourcing from Indian firms can help France address the issue high prices of reactor parts. ...

Source: *Hindustan Times*, 26 March 2015.

## JORDAN–RUSSIA

### Jordan Signs \$10 Billion Nuclear Power Plant Deal With Russia

Jordan signed an agreement with Russia worth \$10 billion that sets the legal basis for building the kingdom's first nuclear power plant with a total capacity of 2,000 megawatt. Jordan imports nearly 98 percent of its energy from oil products and crude and is struggling to meet electricity demand which is growing by more than 7 percent annually due to a rising population and industrial expansion. The

deal, signed with Russia's state-owned nuclear firm Rosatom, envisages the construction of a two-unit power plant at Amra in the north of the kingdom by 2022.

"The Russian technology we chose in a very competitive process suits Jordan's needs in terms of power generation and the ability to produce electricity at very competitive prices," Khaled Toukan, chairman of the JAEC, told a news conference. The deal provides for a feasibility study, site evaluation process and an environmental impact assessment. Jordan hopes that eventually nuclear power could provide almost 40 percent of its total electricity generating capacity. Russia was selected in October 2013 as the preferred bidder to supply

Jordan with its first nuclear power plant. The first of the two units is expected to start operating after 2022 and the second two years later.

The chief executive officer of Rosatom, Sergey Kiriyyenko, said cooperation with Jordan would open the door for future nuclear fuel supply deals. "The nuclear power plant is the embodiment of a strategic

partnership," Kiriyyenko said. Russia, especially keen to tap lucrative new markets for its nuclear technology and know-how as it battles

Western economic sanctions imposed over the Ukraine crisis, will meet 49 percent of the project's costs and Jordan the remaining 51 percent.

**Jordan signed an agreement with Russia worth \$10 billion that sets the legal basis for building the kingdom's first nuclear power plant with a total capacity of 2,000 megawatt. Jordan imports nearly 98 percent of its energy from oil products and crude and is struggling to meet electricity demand which is growing by more than 7 percent annually due to a rising population and industrial expansion.**

In February, Moscow and Cairo signed a memorandum of understanding to build Egypt's first nuclear power plant during a visit to that country by Russian President Vladimir Putin. Rosatom signed an agreement earlier in 2015 to build two reactors in Hungary and also hopes to build more reactors in Iran in addition to the Bushehr plant launched there in 2011. Rosatom's investment program, sourced

from Russia's state budget, allows it to spend about \$300-\$350 billion per year to build nuclear plants in Russia and abroad, a business that has been hit by global safety concerns after the 2011 Fukushima nuclear disaster. Rosatom maintains its reactors are the world's safest.

Source: <http://www.reuters.com>, 24 March 2015.

## KOREA–QATAR

### Korea Extends Nuclear Cooperation to Qatar

South Korea and Qatar are to cooperate on the training of nuclear experts and on the construction of a research reactor under a MOU signed between the two countries. During a meeting

between South Korean president Park Guen-hye and Qatari Emir Sheikh Tamim bin Hamad Al Thani in Doha, an MOU was signed by Qatar's Ministry of Energy and Industry and Korea's Ministry of Science, ICT and Future Planning. The agreement calls for cooperation on human resources development and research on peaceful uses of nuclear energy. Following the signing of the MOU, Park said

in a statement she hoped "that substantive cooperation in the area would be broadened".

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Tamim also said he looked forward to the expansion of cooperation on the basis of the MOU and expressed his interest in "importing reactors for research purposes to nurture experts in his country".

Park's visit to Qatar marked the final stop in her tour of the Middle East. Middle of March an MOU was signed by the KAERI - designer of the SMART - and Saudi Arabia's KA-CARE. It was signed in Riyadh following a meeting between Park and Saudi's newly-crowned King Salman bin Abdulaziz al Saud. Under the agreement, the two countries will conduct a three-year preliminary study to review the feasibility of constructing SMART reactors in Saudi Arabia. The cost of building the first SMART unit in Saudi Arabia is estimated at \$1 billion, the agreement states.

Qatar has undertaken its own investigation into the viability of nuclear power and late in 2008 announced that there was not yet a strong case for proceeding, especially in the absence of modern 300 to 600 MWe reactors being available. However, in 2010 it raised the possibility of a regional project for nuclear generation. In 2010 Qatar signed a nuclear cooperation agreement with Russia's Rosatom. In December 2009, the UAE's Enec placed a \$20 billion order with a consortium of South Korean companies for the construction of four APR1400 reactors. The contract marked South Korea's first overseas nuclear order.

Source: <http://www.world-nuclear-news.org>, 09 March 2015.

## **MYANMAR-RUSSIA**

### **Russia, Myanmar Reaffirm Nuclear Cooperation**

Russia and Myanmar have agreed to cooperate in nuclear energy, Rosatom said, during the first of a two-day working visit to the Southeast Asian country by its deputy director general Nikolay Spassky. During his visit, Spassky met Myanmar vice president Nyan Tun and armed forces chief

Min Aung Hlaing, and held talks with the minister of science and technology Ko Ko Oo and electric energy minister U Khin Maung Soe. "The discussion focused on how to establish mutually beneficial cooperation in the peaceful uses of nuclear energy. The parties agreed on concrete steps aimed at creating favourable conditions for cooperation in the use of advanced nuclear technology, including strengthening the legal framework for cooperation and training," Rosatom said.

In May 2007, the two countries signed an agreement to construct a nuclear research center in Myanmar - formally known as Burma - that would comprise a 10 MWt light water reactor working on

20%-enriched U-235, an activation analysis laboratory, a medical isotope production laboratory, silicon doping system, nuclear waste treatment and burial facilities. Myanmar has been a signatory of the NPT since 1992 and a member of the International Atomic Energy Agency since 1957.

Source: <http://www.world-nuclear-news.org>, 26 March 2015.

## **NUCLEAR PROLIFERATION**

### **IRAN**

#### **Iran Isn't Providing Needed Access or Information, Nuclear Watchdog Says**

The head of the IAEA said that Iran has failed to provide the information or access needed to allay the agency's concerns about the weapons potential of the country's nuclear program. With the deadline nearing for international talks on constraining Iran's nuclear program, Yukiya Amano, director general of the IAEA, said in an interview that Iran has replied to just one of a dozen queries about "possible military dimensions" of past nuclear activities.

Amano said that Iran has provided only "very limited" information about two other issues, while the rest have not been addressed at all. "Recently,

the progress is very limited," he said. The IAEA is the United Nations' nuclear watchdog, and its inspections are considered a key safeguard against countries using civilian nuclear energy technology to produce weapons. Failure by Iran to comply with IAEA demands would undermine the country's efforts to win the lifting of UN sanctions.

Amano said that the six global powers negotiating with Iran should insist that the country implement the additional protocol that would allow IAEA inspectors to go anywhere at any time to examine sites suspected of harboring secret nuclear weapons development. He said that he spoke to Iranian Foreign Minister Mohammad Javad Zarif on Feb. 7 in Munich but noted that Iran has not yet provided the information the agency needs. Amano met with US Secretary of State John F. Kerry. He was scheduled to meet later with President Obama's national security adviser, Susan E. Rice. That additional protocol, Amano said, will be "very much needed. It will give us more powerful tools to look at activities not declared to us." He said that in the past the agency has had two to four inspectors in Iran, but that recently there have been as many as 10.

Iran signed the protocol in December 2003 and initially implemented it, Amano said, but the country ended its compliance in 2006. Amano said that near the top of his list of unanswered questions about possible military dimensions of Iranian nuclear activities was the Parchin military complex. He said that the IAEA has information that Iran conducted experiments in a high-explosive chamber there.

... Amano said that looking at sites with military nuclear potential was "like a jigsaw puzzle." He said, "As we have a better understanding of one issue, we have better understanding of another

issue." Amano said that the IAEA's failure to detect Iraq's nuclear weapons program in the 1980s had forced the agency to demand unfettered access to countries suspected of building weapons in secret.

In openly declared sites, he said, the agency places cameras and seals in strategic places so that it can "detect abnormalities in a timely manner," ranging from a day to a week. Amano's comments come after a Feb. 19 report the agency sent to member governments that complained about Iran's lack of responsiveness. The report said: "The Agency remains concerned about the possible existence in Iran of undisclosed nuclear related activities involving military related organizations, including activities related to the development of a nuclear payload for a missile."

Although Iran has declared to the IAEA 18 nuclear facilities and nine other locations where nuclear material is used, the agency said in its report that it "is not in a position to provide credible assurance about the absence of undeclared nuclear material and activities in Iran, and therefore to conclude that all nuclear material in Iran is in peaceful activities."

Source: <http://www.washingtonpost.com>, 24 March 2015.

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## **NUCLEAR SAFETY**

### **INDIA**

#### **IAEA Urges India to Take Further Action for Nuclear Regulation**

The IAEA urged India to further tighten its nuclear safety regulations by assuring the legal independence of its atomic watchdog and allowing more outside inspections. India, which has tested nuclear weapons but is a non-signatory of the NPT, announced a major deal in January

designed to open India's nuclear power sector to US investment. The deal came after Prime Minister Narendra Modi agreed last year to tighter checks of India's civilian nuclear programme by the IAEA.

After a 12-day visit to India, the agency recommended that India and its AERB take further action to assure safety in its nuclear industry. "The government should embed the AERB's regulatory independence in law, separated from other entities having responsibilities or interests that could unduly influence its decision making," the IAEA said in a statement. "The AERB should consider increasing the frequency of routine on-site inspections at NPPs to allow for additional independent verification and more effective regulatory oversight," it added, referring to NPP.

The nuclear "breakthrough understanding" between US President Barack Obama and Modi seeks to allay US concerns about industry liability and unlock billions of dollars in investments into Indian power projects. "AERB is committed to pursuing the improvements suggested by the mission towards further

strengthening the regulatory framework," the IAEA quoted the chairman of the AERB, S.S. Bajaj, as saying. Both India and Pakistan tested nuclear weapons in 1998, setting off an arms race between the neighbouring rivals.

Some countries view the fact that India is a non-signatory to the NPT, which was set up to prevent states from acquiring nuclear weapons, as a stumbling block to it joining the NSG. Membership in the NSG, a trade body established to ensure that civilian nuclear trade is not diverted for military aims, could boost India's international standing as a responsible atomic power and also give it greater influence on issues related to global nuclear trade. A review conference of the NPT will start in April.

Source: <http://in.reuters.com>, 27 Mar 2015.

### **India's N-Insurance a Positive Step, Says IAEA**

A new insurance pool for nuclear suppliers to Indian nuclear power plants has got a thumbs up from Yukio Amano, director general IAEA. In an exclusive conversation with TOI during a visit, Amano said, "I think it is a positive step. India introduced domestic law and took initiative of insurance pool. The basic understanding was reached between US and India. We also understand that India has signed the CSC and intends to ratify it."

The Convention for Supplementary Compensation (CSC) is intended to allow India to access international funds for compensation in case of nuclear damage. This compensation is built into the Indian nuclear liability law. Amano said the CSC would be finally entering into force on April 15. "It's a difficult convention and the entry into force was supposed to be very difficult. It's a complicated convention – technically, legally, it's difficult. But there has been a positive development – US and Japan have both ratified the CSC,

which now makes it possible for the convention to enter into force."

Does India have to ratify before April 15? No, said Amano. India can join up later as well. Expressing satisfaction over India's separation plan and the follow up action to the India-US nuclear deal, Amano said, "In 2008, an important decision was made in NSG to amend rules. India committed to place 14 reactors under safeguards and all the reactors are now under safeguards. India's accession to Additional Protocol is also complete, and it has entered into force. India has honoured its commitment. It is our understanding that future civil nuclear power plants will be placed under safeguards."

Fukushima halted the global march towards nuclear power, he said. But four years since then,

**Expressing satisfaction over India's separation plan and the follow up action to the India-US nuclear deal, Amano said, "In 2008, an important decision was made in NSG to amend rules. India committed to place 14 reactors under safeguards and all the reactors are now under safeguards. India's accession to Additional Protocol is also complete, and it has entered into force. India has honoured its commitment."**

countries are once again adopting nuclear power. Climate change and the quest for clean energy is driving global interest in nuclear power. "As of today, 440 nuclear plants are in operation and 69 are under construction. This is very different from what happened after Chernobyl. After Chernobyl, in reality there was no construction. But this time it isn't so."

"By latest estimates," said Amano, "by 2030 there will be an increase of nuclear power by a minimum of 8% or maximum of 88%. Why the big difference? Because it depends how serious countries take climate change or economic development or energy security. If these are important issues for the country, nuclear has a role to play."

There are two big changes in the world of nuclear power after Fukushima. "The first is safety. Countries now accord higher priority to safety. I ask every operator, what's the difference after Fukushima. Everybody shows me greater and better safety features they have installed. Not exotic technologies, but basic things. This accumulation of basic things and human elements, what we call the safety culture is taking root." The second difference, he said, is the centre of gravity for nuclear power has shifted out of Europe. The growth centre is "Asia, and in developing countries. In 2009 I said developing countries should, like developed countries, have access to nuclear power. That is happening now. More countries have interest in nuclear power. They need electricity."

*Source: The Times of India, 28 March 2015.*

### **Rs 1,500 Crore Insurance Pool to Indemnify Nuclear Reactor Suppliers**

India has launched a Rs 1,500 crore insurance pool to indemnify international and domestic nuclear reactor suppliers against liability in case of an accident. The measure comes a little over a month

after the nuclear liability law became functional. The pool was launched at a daylong workshop of Indian Nuclear Insurance Pool organised by the MEA. Terming the meet a very successful, MEA sources said both global and domestic reactor suppliers were happy with the detailed paper that the ministry launched in February on the functioning of the liability law. The prospective suppliers are also understood to have expressed satisfaction with subsequent action by the government to expedite the process of setting up of reactors.

The government has made it clear that the liability law will not be amended, but has suggested the Indian Nuclear Insurance Pool as a mechanism to transfer risk of companies. Five public sector firms, led by General Insurance Corporation of India, will provide Rs 750 crore for the project, while the Centre will contribute a matching sum. Seven more insurance firms, including private ones have joined the pool, sources said. The workshop was addressed by GIC CMD, besides senior MEA officials, DAE officers, and representatives of US nuclear insurer and French nuclear pool. A senior official of the NPCIL and members of prospective domestic suppliers also made presentations.

The aim of the workshop was to bring foreign and domestic equipment suppliers to address concerns over the issue of legal responsibility and explain the way an insurance pool works, including in countries like the US and France. Sources informed that discussions were held on how premium for such insurance would work. Suppliers have raised objections to India's CLNDA that says nuclear equipment suppliers are liable for damages from an accident, as firms say this is a deviation from international norms that put the onus on the operator. The liability law had proved to be a stumbling block to the India-US nuclear act. Even Russians were not satisfied with the law.

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Source: <http://articles.economictimes.indiatimes.com>, 21 March 2015.

## USA

### Feds Probe PG&E Report on California Nuclear Plant Safety

Federal investigators have launched a probe into whether the NRC erred when it let Pacific Gas and Electric Co. change earthquake safety standards at the Diablo Canyon power plant without public hearings, The Chronicle has learned. The regulatory agency's own internal watchdog – the Office of the Inspector General – has been delving into the issue, which is the subject of a lawsuit filed in the fall by environmentalists trying to close Diablo Canyon, California's last nuclear plant.

In addition, the investigators are looking into complaints that the commission and PG&E colluded to dismiss seismic safety concerns raised by one of the commission's former inspectors at Diablo Canyon, which is near San Luis Obispo on a stretch of coast riddled with fault lines. The inspector, Michael Peck, argued that the plant was no longer operating within its license and should be shut down until PG&E demonstrated that the reactors and other equipment could survive earthquakes on recently discovered faults nearby.

The Chronicle spoke with several people who have been contacted by the investigators. A commission spokesman declined to comment on the investigation, referring calls to the inspector general's office instead. The Office of the Inspector General did not return calls seeking comment. Friends of the Earth, the environmental group that filed the lawsuit, welcomed news of the probe.

**Concerns Confirmed:** ... A PG&E spokesman said the company had not been contacted by

investigators and has complied with all the commission's regulations. The company in March released a report indicating that Diablo Canyon could withstand the strongest earthquakes likely to occur at the site in the next 10,000 years. That report included the Shoreline Fault, which was found in 2008 and runs within 2,000 feet of the reactors. ...Based on conversations with people who have spoken to the investigators, the probe explores several issues related to Diablo Canyon's seismic safety. The plant's seaside location is nearly surrounded by fault lines discovered after construction began in 1968.

One issue concerns the amount of shaking Diablo Canyon is expected to survive during an earthquake. The plant was originally designed to safely shut down after an earthquake producing ground movement as intense as 0.4 times the force of gravity. But in 1971, geologists working for Shell Oil Co. identified a fault just

3 miles offshore, the Hosgri Fault, capable of creating ground motions at the plant up to 0.75 the force of gravity.

PG&E concluded that Diablo Canyon could survive the extra shaking. But the methods PG&E used to measure the threat posed by the Hosgri were different from – and less conservative than – the methods used to set the plant's initial seismic safety standards. In 2011, after other faults had been found nearby, PG&E asked the commission to amend its license to stipulate that the plant could safely shut down after ground motions of 0.75 the force of gravity, based on that less conservative Hosgri Fault methodology. The commission refused and told PG&E to withdraw its request. Still, PG&E in 2013 changed the plant's final safety analysis report – a document required by Diablo's license – to say it can withstand such a quake using the Hosgri Fault methodology.

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That move prompted the lawsuit from Friends of the Earth, which argued that such a fundamental change required a formal license amendment with public hearings. And now investigators are exploring whether the commission followed its own policies when it let PG&E make the change.

**Nuclear Expert Weighs In:** "They're trying to figure

out how in the world can you make the law fit these facts," said Dave Lochbaum, a former nuclear plant engineer and director of the nuclear safety project at the Union of Concerned Scientists. Lochbaum said the investigators have interviewed him twice to date. Peck, the former commission inspector at Diablo Canyon, filed a formal objection with the commission in 2013, saying any new methodology to assess seismic safety at

Diablo Canyon would require a license amendment, if the methods were less conservative than those used in the original license. He also insisted that because the newly discovered faults can produce shaking far in excess of 0.4 times the force of gravity, Diablo is operating outside the bounds of its license and should be shut down until PG&E can demonstrate it's safe. He was overruled by the commission.

PG&E insists that because the new faults are estimated to produce shaking less than 0.75 times the force of gravity, Diablo Canyon remains safe. PG&E maintains that it has always had to satisfy two seismic safety standards at Diablo: both for a 0.4 ground motion earthquake and a 0.75 quake on the Hosgri Fault, assessed with the company's less-strict methodology. Peck and PG&E's critics say that only the 0.4 quake, assessed with the original methodology, is part of the formal design basis for the plant's license. It is, therefore, the only standard that matters, Peck said. ...

Source: <http://www.sfchronicle.com>, 25 February 2015.

## NUCLEAR WASTE MANAGEMENT

### UK

#### First Radioactive Waste Removed from Magnox Storage Pond

The very first radioactive sludge has been removed from the FGMSP at Sellafield in north-west England. The FGMSP is one of the site's four Legacy Pond and Silo facilities. Constructed in the 1950s to store, cool and prepare used Magnox nuclear fuel for recycling into new fuel, the FGMSP "urgently" needs to be emptied of 1500 cubic metres of radioactive sludge lying at the bottom of the pond which is equivalent to more than half an Olympic sized swimming pool, Sellafield Limited said. The

FGMSP is "one of the most hazardous nuclear plants in Europe", it added.

During the FGMSP's 26 year operating lifetime it processed approximately 27,000 tonnes of fuel - almost 2.5 million fuel rods. Used nuclear fuel from the UK's nine Magnox stations, along with Magnox fuel from both Italy and Japan was held in the FGMSP. The pond holds some 14,000 cubic metres of contaminated water, in which is stored Magnox used nuclear fuel, radioactive sludge, miscellaneous nuclear wastes and skips. The plan is to progressively retrieve and treat the radiological inventory residing in the facility, reducing the on-going risk posed by its storage and then reducing the inherent hazard posed by the materials.

"We're making history at Sellafield by transferring the first sludge using a tried and tested pump to a new £240 million state-of-the-art sludge storage plant containing three enormous stainless steel buffer storage vessels, each of which is the same volume as seven double decker buses," Martin Leafe, head of the FGMSP, said. The vessels were

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brought to the Sellafield site in separate sections and then welded together before being slid into the reinforced concrete building. The welding of each vessel involved over 2000 metres of weld run, "which was done 99% right first time", the company said. All welds were then radiographed to ensure the required integrity and that there will be no leaks.

The sludge is a similar consistency to sand and has to be carefully removed, whilst leaving the water in place to provide a radioactive shield for the stored nuclear fuel. Its retrieval from the pond will enable the remaining radioactive inventory to be progressively removed to reduce the inherent hazard posed by the facility. The pond holds some 14,000 cubic metres of contaminated water, in which is stored Magnox used nuclear fuel, miscellaneous nuclear wastes and skips all of which is draped in blanket of radioactive sludge.

The pond has thick reinforced concrete walls however it was built with no roof and is "open to the elements", Sellafield Limited said, so sludge has been accumulating at the bottom of the pond "just like in any other garden pond". The difference is that this sludge is radioactive made up of nuclear fuel corrosion products, algae and windblown material, so it requires careful handling, it added. "The pond is six metres deep and we've spent years devising an engineering solution to literally suck up the radioactive sludge from the bottom of the pond, which in places is over one metre deep. What makes the job more difficult is that the pond is very congested and full of large metal boxes containing nuclear fuel, so we need to work around these and ensure these remain fully submerged at all times. Just to make matters more difficult we have to drive the platform remotely from a control cabin to minimize the radiation dose to the workforce," Leafé said.

Source: <http://www.world-nuclear-news.org>, 24 March 2015.

## **USA**

### **US Government Seeks Sites for Nuclear-Waste Storage**

The US energy department will seek interim storage facilities for commercial nuclear waste, and a permanent geological repository for radioactive material from the country's nuclear-weapons programme, energy secretary Ernest Moniz said on 24 March. The announcement follows more than three decades of contentious debate about a planned geological repository at Yucca Mountain in Nevada. The DOE halted work on the project in 2010 owing to political opposition in the state. The DOE is now pursuing a 'consent-based' approach designed to build support at the local and state levels before new waste facilities are designated.

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"We think these steps are just common sense," Moniz

said during a presentation in Washington DC. "The lack of a consent-based approach is pretty close to a fatal flaw in attempts to site these facilities." He cited plans announced February by the Waste Control Specialists in Dallas, Texas – to build a private nuclear-waste repository in Texas – as a sign that some communities are ready to engage with the government on storage issues. The DOE's plan pursues a two-pronged approach to handling nuclear waste. A 24 March decision by US President Barack Obama allows the DOE to put defence-related waste – roughly 5% of the total – in a different repository from commercial reactor waste. The move reverses a policy that former president Ronald Reagan put in place in 1985, which directed the two types of waste to be stored together.

Moniz says that Obama's decision will allow the DOE to identify different solutions for different types of defence waste: waste that is stabilized in glass logs could be placed in a more traditional underground repository, whereas other types of

waste could be packaged and buried in deep boreholes. The DOE's budget proposal for fiscal year 2016 includes money for a deep-borehole experiment along those lines. Moniz said that the department also plans to develop a pilot interim storage facility for spent nuclear fuel from commercial reactors. And the DOE will begin evaluating locations for a full-scale interim storage facility, although the construction of such a facility would require legislation from Congress

**Early Reaction:** The energy department's approach echoes recommendations from a 2012 White House commission, and legislation

introduced on 24 March by a bipartisan group of US senators. The Senate bill would establish an independent agency to manage nuclear waste and initiate a search for interim storage facilities and permanent repositories. ... Under current law, the DOE is responsible for nuclear waste generated by electricity utilities. The department has already paid out US\$4 billion for failing to meet its obligation to remove waste that is now building up at nuclear power plants. It could be forced to shell out up to \$23 billion more over the next 50 years if the issue is not resolved, Moniz said. ...

Source: <http://www.nature.com>, 24 March 2015.



Centre for Air Power Studies

The Centre for Air Power Studies (CAPS) is an independent, non-profit think tank that undertakes and promotes policy-related research, study and discussion on defence and military issues, trends and developments in air power and space for civil and military purposes, as also related issues of national security. The Centre is headed by Air Marshal Vinod Patney, SYSM PVSM AVSM VrC (Retd).

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