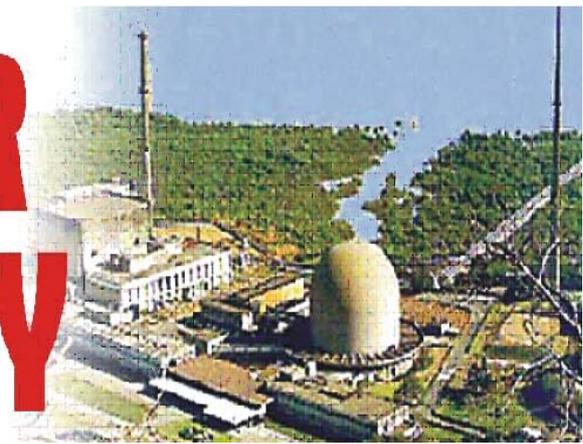


NUCLEAR SECURITY



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

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STATEMENT – Dr RK Sinha, Chairman, Atomic Energy Commission

It gives me great pleasure to congratulate you, Mr. President, on your election as the President of the 57th General Conference. Under your able leadership, I am sure the current General Conference will accomplish all the tasks before it....

We are meeting now after two important meetings related to nuclear energy, namely, the Fukushima Ministerial Conference in Japan during 15-17 December 2012, and the IAEA International Ministerial Conference on Nuclear Power in the 21st Century in the Russian Federation during 27-29 June 2013. Both these meetings have underscored the role that nuclear energy continues to play in the energy mix of various countries for achieving energy security and sustainable development goals in the 21st century for their respective populations. The international community has learned its lessons from the Fukushima Daiichi accident and come out with new guidelines for further enhanced levels of safety of nuclear reactors against beyond- design-basis accident scenarios.

India is committed to implement the highest standards for the safety of Indian nuclear power plants and the associated fuel cycle facilities. India will continue to participate and assist the IAEA Secretariat in its endeavour to enhance nuclear safety through the cluster of measures it has formulated in the IAEA Action Plan on Nuclear Safety. In this connection, I wish to inform you that the first IAEA Operational Safety Review Team (OSART) mission to India for Rajasthan Atomic Power Station (RAPS) units - 3&4, took place during 29 October to 14 November 2012. A follow-up OSART mission is planned in 2014. Preparation and planning for inviting IAEA's Integrated Regulatory Review Service (IRRS) for peer review of our regulatory system is also in progress, and India will approach the Agency in due course with a request to undertake this mission.

Further, as I had informed last year, India, along with the IAEA, organised an International Workshop on "Safety of

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Multi-Unit Nuclear Power Plant Sites against External Natural Hazards" at Mumbai, during 17-19 October 2012. The Workshop addressed the complex task of safety evaluation of a multi-unit site with respect to multiple hazards, such as earthquake, tsunami and fire. The Workshop was attended by experts from regulatory authorities and plant operators from different countries as well as the IAEA. Actions taken by Member States and International Organisations following Fukushima Accident were also discussed.

I now turn to updating on India's progress in the three-stage nuclear power programme, formulated under the visionary leadership of Dr. Homi Jehangir Bhabha. India has adopted the policy of a closed nuclear fuel cycle in order to extract the maximum energy from the limited uranium resources, to ensure sustainable nuclear waste management, and above all, to achieve sustainable, long-term energy security through utilisation of thorium. The performance of the Indian nuclear power plants (NPPs), as well as of the several fuel cycle facilities, reached their highest levels last year. This includes NPPs registering 80% capacity factor, PHWR fuel production of 812 MT (an increase of 8% over the previous year), and the highest ever production of heavy water with the lowest specific energy

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consumption. The average annual availability of the Indian NPPs has remained at 90%. Six of the nineteen reactors, currently under operation in the country, have logged continuous operation of more than 300 days during the year. The Indian nuclear power sector has registered over 379 reactor years of safe operation. In this connection, I would like to once again reiterate that the Indian Pressurised Heavy Water Reactors (PHWRs) offer a highly competitive capital cost per MWe and a low unit energy cost.

I am happy to inform you that the first unit of the Kudankulam Nuclear Power Plant achieved its first criticality on 13 July, 2013, and is

expected to begin commercial operation shortly. This plant has been built in cooperation with the Russian Federation. The second unit is also in an advanced stage of commissioning. The construction of four indigenously designed 700 MWe PHWRs, two each at existing sites of Kakrapar in Gujarat and Rawatbhata in Rajasthan, is progressing on schedule, and India is planning to construct sixteen more PHWRs of 700 MWe at five different inland sites.

The construction of the 500 MWe Prototype Fast Breeder Reactor (PFBR) is nearing completion at Kalpakkam. The critical erection of all permanent in-core components has been completed. Filling of sodium in the secondary sodium loop is planned shortly, and PFBR is expected to achieve first criticality in about a year from now. A co-located Fast Reactor Fuel Cycle Facility (FRFCF), to reprocess and re-fabricate the fuel from PFBR, is being set up at Kalpakkam. Necessary site infrastructure has already been created and preparations for launching the Project are being taken up. The Fast Breeder Test Reactor (FBTR), fuelled with unique mixed carbide fuel, located at the Indira Gandhi Centre for Atomic Research (IGCAR) has been performing well with high availability factor, providing valuable operating experience, as well as technical inputs to India's fast reactor programme. Irradiation of indigenously fabricated sodium bonded metallic fuel pins has been initiated in this reactor.

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India has continued to make good progress in finding new uranium resources in the country through extensive exploration work using multiple technologies. As a result of the use of advanced techniques, we have been able to identify new resources of Uranium. Last year, our reserves have registered an increase of about five percent.

India continues to carry forward intense development of Thorium fuel cycle based technologies for demonstration in its AHWR programme. It is heartening to note that one of the Panel Sessions at the IAEA International Ministerial Conference on Nuclear Power in the 21st Century held at St. Petersburg was devoted to the topic 'Drivers for deployment of sustainable and innovative technology'. In this Session, I had the opportunity to share India's rich experience in the development and implementation of Thorium utilisation programme. Thorium-based fuel cycles and technologies present opportunities for enhanced passive safety

features, utilisation of the larger natural resources of Thorium, and inherent proliferation resistance. International collaboration under the IAEA would help provide a much wider resource base for future nuclear technology development in this direction.

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Considering India's domestic strength in nuclear power and non-power applications, India continues to host events in support of many programmes of the IAEA. An IAEA Technical meeting on Advanced Fuel Cycles for PHWR was held in India during April 8-11, 2013. In this Meeting,

twenty one papers were presented covering the areas of new fuel cycle, fuel design, performance, post irradiation examination and accident modeling. An IAEA Inter-regional training course on "Uranium exploration and processing techniques" was hosted by the Uranium Corporation of India Limited at Jamshedpur. Delegates from twenty three countries participated in this Course.

India, as a founder Member of IAEA's International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO), appreciates the significant progress made by INPRO over the years. The INPRO methodology for assessment of innovative nuclear reactors and fuel cycles provides a broad framework for developing specific goals and acceptance criteria for new designs. India continues to support INPRO, and will be making a voluntary contribution of US \$50,000 later this year.

The impact of nuclear power in addressing climate change concerns needs to be emphasised, since nuclear power involves low greenhouse gas emissions. In this direction, the decision of the Director General to organise the Scientific Forum on the theme of Nuclear Applications for a Sustainable Marine Environment during this session of the General Conference, is quite relevant.

India is developing technologies for high temperature reactors and hydrogen production processes. The current R&D activities target technologies for high temperature nuclear reactors, capable of supplying process heat up to 1000°C, and high efficiency hydrogen production processes, such as thermo-chemical processes and high temperature steam electrolysis. In addition, India is also developing hydrogen storage materials, as well as fuel cells for applications in transport and power generation sectors. As a contribution to the IAEA activities related to nuclear hydrogen production, a software tool for Hydrogen Economic Evaluation Programme (HEEP) has been developed by an Indian team under a contract with the IAEA. This tool is being used for economic analysis of nuclear hydrogen production so as to compare various options.

Non-power applications of nuclear and radiation technologies in the area of health-care, water, industry and environmental protection are extremely important. We have been a strong supporter and contributor to the Regional Cooperation Agreement (RCA) initiatives right from its inception, and India is the RCA Lead Country in the area of industrial applications and cancer treatment for the past several years.

The Tata Memorial Centre (TMC), an autonomous institution under the Indian Department of Atomic Energy, continues to play a major role in developing cost-effective methods for cancer diagnosis and treatment. TMC has developed a low-cost screening method for cervical cancer using acetic acid. In a recently published study carried out over twelve years covering 150000 women, it has been shown that the use of this technique has resulted in reducing mortality by 31%....

In addition to the various core activities related to nuclear energy and non-power applications, India is engaged in the development of high technologies in several other areas, including nuclear fusion and particle accelerators. India has an active programme in nuclear fusion. The Steady State Superconducting Tokamak (SST-1) at the Institute for Plasma Research (IPR) has been successfully commissioned with the first plasma obtained on June 20, 2013. With this achievement, India has joined the select group of countries where research in 'Superconducting Tokamak' is currently being carried out.

As a partner in the ITER Project, India is also working on the development of the concepts for Test Blanket Module (TBM). The Indian Lead-Lithium Ceramic Breeder Test Blanket Module will be tested in the ITER machine. The Indian TBM team is involved in the indigenous development of tritium breeder material by solid state reaction and solution combustion methods, as well as in the characterisation of these materials. The Indus-2 Synchrotron Radiation Source at Indore operated at an enhanced current of 158 mA at 2.5 GeV using indigenously developed solid state Radio-Frequency amplifier modules. An indigenously designed and developed Radio Frequency Quadrupole (RFQ) has been commissioned at BARC and a proton beam was successfully accelerated to 200 keV through the RFQ. This is part of the R&D for India's roadmap of Accelerator Driven Systems (ADS). As a part of our accelerator development programme, and also as Indian contribution under an international collaboration initiative, a prototype non-invasive Beam Position Monitor for use in GANIL accelerator facility in France, has been developed and tested in France.

India actively participated in the IAEA International Conference on Nuclear Security at Vienna during July 1-5, 2013. India has signed an Arrangement with the IAEA concerning its voluntary contribution to the Nuclear Security Fund. During the last year, we have identified activities to be taken up with the IAEA and look forward to holding the first activity - "Review of Guiding Principles on applying Computer Security Controls to Instrumentation & Control Systems at Nuclear Facilities" during September 23-27, 2013. This activity will be held under the aegis of the Global Centre for Nuclear Energy Partnership (GCNEP), being established near Delhi. Off-campus activities of GCNEP are taking place, involving organisation of different training programmes. Recently, a National Programme on Prevention and Response to Radiological Threats was organized during August 26-30, 2013 at GCNEP. During the current year, two other programmes, one on Food Irradiation, and the second on Radiological Safety, were organised.

To conclude, I would like to look ahead at the world energy scenario beyond 2050. By then the accessibility and affordability, if not the global availability, of the fossil fuels will decline. Other energy sources, including nuclear, will need to bridge this deficiency so as to ensure clean and sustainable energy supply for different sectors, and at various scales. This would, in turn, necessitate a more rational approach and strategy, seeking a well-balanced use of all the energy resources available to us. Apart from electricity, nuclear will need to address the large-scale energy needs for industrial use and transport as well. In this context, ten years ago, the IAEA Scientific Forum had discussed the rising hydrogen economy, including the fuel's future production by advanced next generation nuclear power plants. The IAEA's latest Nuclear Technology Review is now carrying a feature article on, 'Nuclear Hydrogen Production Technology'.

Considering the long gestation period for deployment of new technologies in the nuclear field, it is essential to further strengthen the role of the Agency for facilitating pooling of international knowledge resources, to achieve sustainable energy security at the global level, looking at the challenges of the future.

Source: Excerpted from speech delivered at the 57th IAEA General Conference, Vienna, 18 September 2013. Full text available at DAE website

OPINION – Mohit Abraham and M. P. Ram Mohan

Don't Waver Now on Nuclear Liability

India's Civil Liability for Nuclear Damages Act, 2010, was a watershed moment in international nuclear liability jurisprudence because of the unique way in which it dealt with supplier liability. Up until this enactment, all liability in relation to a nuclear power plant was channelled exclusively to the operator. The only two situations in which an operator could claim a subsequent right of recourse against a supplier under international liability law as well as under domestic law of other countries were i) where the nuclear incident arose out of an act or omission by the supplier with an intent to cause damage (which is covered under Section 17(c) of the Act); and ii) a contractual right of recourse (which is covered under Section 17(a) of the Act). The Act however, also introduced a novel concept of supplier liability in Section 17(b) by which the operator would have the ability to reclaim any compensation it may

pay, from a supplier, if the product supplied has patent or latent defects or the service provided is substandard.

This expanded concept of supplier liability is vehemently resisted by major supplier countries including the US, Russia and France, on the ground that these provisions are not consistent with international norms pertaining to nuclear liability. Parliament, however, deemed it fit to deviate from these international norms owing to India's history with industrial accidents, particularly the Bhopal gas tragedy, and felt that this additional requirement contained in Section 17(b) was necessary in the Indian context. Recent news reports (19 September 2013, The Hindu) now indicate that the Attorney General has provided a legal opinion to the government opining that Section 17(a) provides for a right of recourse if such right is expressly provided for in a contract in writing and the operator is therefore free to choose not to incorporate

such a provision in its contract with the supplier. It is understood that the opinion goes on to confirm that the operator can either incorporate a clause in the contract to cover the right of recourse under Section 17 or can waive such a right. It is also understood that the Attorney General gave this opinion from a strictly legal point of view and not policy.

An important point to note here is that a plain reading of Section 17 seems to suggest that Section 17(a), (b) and (c) are distinctive and separate. Merely because a contractual right of recourse in terms of Section 17(a) has been used or not used by an operator in his contract with a supplier, would have no bearing on Sections 17(b) and (c). This argument is strengthened, as it would be unthinkable for the government to waive a right of recourse in situations covered under Section 17(c) that deals with causing of nuclear damage with an intent to cause such damage. In other words, hypothetically, can the operator take a stand that it would waive its right of recourse against a supplier who causes nuclear damage intentionally? The answer would obviously be no. Therefore, if the exclusion cannot be made for sub-clause (c), exclusion for sub-clause (b) is also not possible and Section 17(a) cannot be the basis for reading such a right of waiver.

Another point to note is that in India, the nuclear operators, viz. the NPCIL and the BHAVINI, are wholly government owned. Therefore, the entire responsibility of setting up and running a nuclear power plant rests with these entities. Consequently, under nuclear liability laws, in the event of

a nuclear accident, compensation that may be payable would have to be borne by these entities. Since these entities are government entities, the funding is also entirely by the government and, therefore, ultimately by the taxpayers of India. In this backdrop, can the Indian operator contractually agree with a supplier to waive its right of recourse under Section 17(b) of the Act to recover such compensation from a supplier who may have provided a component with "patent or latent defects"?

A preliminary analysis suggests that it would be difficult to legally sustain such a blanket waiver. The law in relation to waiver of a statutory right is well settled. The Supreme Court of India has held that a statutory right in favour of a party can be waived by such party as long as no public interest or public policy is adversely affected (see for e.g. Krishna Bahadur v. Purna Theatres (2004)). If NPCIL were to waive its right to claim subsequent compensation against a supplier who has provided a product with a "patent or latent defect" or has provided "substandard service," it would mean that the compensation is ultimately being footed by the taxpayer despite the fact that there is a law which enables NPCIL to seek such compensation from a negligent supplier. This would squarely be against public interest and appears to be legally unsustainable.

If Parliament, in its wisdom, has decided to introduce an expanded concept of supplier liability in the Act, it can also be argued that this forms part of the public policy of India — a consideration, which it is understood, is expressly excluded from the Attorney General's legal opinion. Further, Section 23 of the Indian Contract Act, 1872 also provides that the consideration or objects of a contract would be unlawful if it would defeat the provisions of a law or is opposed to public policy. While a strong case can be made out that such waiver would defeat the provision of the Act, it can also be argued that it would be against the public policy of India. The Supreme Court in Rattan Chand Hira Chand v. Askar Nawaz Jung (1991) held that a contract which has a tendency to injure public interests or public welfare is one against public policy and what constitutes an injury to public interests or welfare would depend upon the times in which the issue arises. It is therefore important to remember that the ultimate interpretation of these provisions and contractual arrangements is going to be by an Indian court in the backdrop of a nuclear incident. In such a backdrop, it is

more likely for an Indian court to adopt an interpretation that rejects an attempt at circumventing the provision of the Act by providing a waiver of a right of recourse, as this would be against public interest.

Parliament has framed a law that has an expansive concept of supplier liability and all entities, foreign or Indian, are subject to this law. If there were problems in the implementation of the law, then the right course would be for Parliament to amend such laws. The Act, as it stands, has various ambiguities in relation to the scope of supplier liability. These ambiguities are undoubtedly a hurdle for foreign suppliers and ought to be clarified or removed. Some of these hurdles can be avoided by providing for contractual provisions by which the Indian operator provides timely feedback to the supplier in relation to the functioning of a particular component or perhaps even certifying after a period of time of usage of the component,

that the component does not suffer from a "patent or latent defect". This kind of an approach by the operator may be more helpful for the supplier community rather than an approach in which the Indian operator says it is giving a blanket waiver of its statutory right of recourse.

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The Act does have its flaws but it has raised some key challenges to international liability principles that historically insulated the supplier from liability in practically all situations. It should be borne in mind that these provisions will be interpreted by an Indian court in the context of a nuclear incident.

historically insulated the supplier from liability in practically all situations. It should be borne in mind that these provisions will be interpreted by an Indian court in the context of a nuclear incident. Any watering down of the law by the operator offering waivers of statutory provisions would only increase the ambiguities, and is in no one's interests, including those of the foreign suppliers.

Source: Abraham is a Partner with PXV Law Partners and Ram Mohan is Fellow, The Energy and Resources Institute (TERI). Both are on the governing board of the Nuclear Law Association of India, The Hindu, 20 September 2013.

OPINION – The Indian Express

Ensure Transparency in Nuclear Negotiations

Media disclosures that the UPA government was using its Attorney General's opinion to dilute provisions of India's Civil Liability for Nuclear Damage Act and rush into a deal between US-based nuclear reactor building company Westinghouse and the NPCIL have pushed the ruling establishment into a damage control mode. With the BJP and Left raising the war bugle, external affairs minister

Salman Khurshid on 19 September 2013 said the law and Parliament's approval remained supreme. The department of atomic energy clarified that there was no question of subverting Indian law. However, NSA Shivshankar Menon confirmed on 20 September 2013 that India is "close to" clinching the commercial aspect of its civil nuclear deal with the US "by addressing the concerns of US suppliers over its nuclear liability law". It is understandable that PM Singh, who risked his government in 2008 to get the India-US Civil Nuclear Agreement passed by Parliament, should be keen to implement it when he meets President Obama this September 2013.. India's civil liability law has stalled the implementation of the deal, as US power firms are averse to set up plants until certain clauses are amended.

The government needs to allay fears about how it plans to address foreign suppliers' "concerns" without subverting the law. It must also explain the need for the hurry in inking the agreement, which the NPCIL initially considered economically unviable and drafted without due diligence. There is no doubt that nuclear power can play a major role in propelling India's growth engine. But it has to be clean and safe. If the government wants nuclear power to evolve in a fruitful direction, it must ensure total transparency in negotiations involving nuclear installations. Its policy on civilian use of nuclear energy must be honest, transparent and credible. Most important, it must convince the people of its safety so that it can restore their confidence.

Source: <http://newindianexpress.com/>, 21 September 2013.

OPINION – R Rajaraman

Decisive Action Against Any Pakistani Misadventure Is Best Way To Establish Nuclear Credibility

The establishment of a "credible minimum deterrent" is a central principle underlying the Indian nuclear doctrine. But whereas the implications of 'minimal deterrence' have been widely analysed, the status of 'credibility' of that deterrent needs more discussion. At first glance the two may seem unrelated since terrorism has mercifully remained non-nuclear so far, but there is a link between them. As things stand, belief in the credibility of our nuclear deterrent is not universal. There are many sceptics

in India and Pakistan, let alone China. Where does their scepticism, valid or not, come from? Is it from the lack of an adequate nuclear arsenal to launch a successful nuclear strike? That is certainly not the case, at least with respect to Pakistan as an adversary. In addition to fissile materials worth 80-90 warheads, India has been steadily developing land, air and submarine-based delivery assets.

Altogether this is already more than enough to launch a punitive second strike on Pakistan. (China is a different matter. We may have the warheads but not yet the vehicles to deliver them to Chinese targets.) If despite this arsenal concerns remain about the credibility of our nuclear deterrent, they stem from our will to strike back. Many in Pakistan (and even in India) believe that India is too soft a

How do we go about jacking up our credibility? Not by ratcheting up the rhetoric. Nor by simply piling up more and more warheads, as some hawkish commentators would have us do. The only way to directly establish our nuclear credibility would be, heaven forbid, by actually executing a "massive" nuclear retaliation some day. But that would be too late for credibility since deterrence would have already failed. In nuclear war there are no second chances. The best one can do is to respond decisively on other non-nuclear fronts to establish some overall credibility.

state to actually go through with a nuclear attack which would decimate cities and kill lakhs of people. When the moment of decision comes will our leadership be willing to actually push the button, even in retaliation to a first strike? Added to this is the tendency of the Indian system to dither over any issue. Can it take lightning fast decisions of the kind needed for a nuclear second strike before further attacks come or international pressure builds up? The dilemma will become particularly acute if Pakistan's first attack uses just a small battlefield nuclear weapon. Although that may cause far fewer casualties than a full-fledged nuclear attack, India, as its nuclear doctrine declares, would be free to

hit back massively with nuclear forces.

That India would not do so is a gamble Pakistan could take if it is not convinced of the credibility of India's deterrence policy. This is not an implausible scenario, given Pakistan's new nuclear-capable missile, Nasr, with a 60km range and designed to repel a possible incursion by the Indian army. If the Pakistani judgment turns out to be correct and we do not launch a nuclear counterattack, it would further erode the credibility of the Indian deterrent. And if its judgment proves wrong and we do counter-attack, as threatened in our nuclear doctrine, it would lead to a full-fledged nuclear war, which neither country wants. It would have been best if the subcontinent had never gone nuclear in the first place...

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nuclear credibility would be, heaven forbid, by actually executing a "massive" nuclear retaliation some day. But that would be too late for credibility since deterrence would have already failed. In nuclear war there are no second chances. The best one can do is to respond decisively on other non-nuclear fronts to establish some overall credibility. An example would be our response to Pakistani terrorist attacks such as the one on Parliament and the 2008 Mumbai attack. The Indian government was wise in exercising restraint on both those occasions and numerous other lesser but still deadly attacks.

If despite our restraint so far yet another major attack takes place on Indian soil, funded, organised or masterminded by elements in Pakistan, we must seriously consider a counter-attack. Not a nuclear attack, obviously, nor a major conventional war, but a quick, focussed strike on selected terrorist hideouts or support facilities in Pakistan.

True, even a limited retaliation would be a very serious step. It could lead to a full-scale war but this bluff needs to be called. Pakistan is unlikely to initiate yet another losing war. Retaliation against terror will admittedly distract our government's attention from the far more important problems of economic growth and development. But these governance issues will be with us for years. Meanwhile, should we keep on tolerating terror attacks perpetually? Perhaps we should, but then we cannot expect credibility for retaliation on the far more serious nuclear front, especially in response to a limited battlefield nuclear strike.

Source: Author is emeritus professor of physics, Jawaharlal Nehru University. Times of India, 20 September 2013.

OPINION – Hasan Ehtisham

Concerns Over Indian Nuclear Capabilities

Any nuclear accident in India could have serious fallout on its neighbouring countries and hence the poor safety and security measures are of great concern. Ever since the India-US nuclear deal has taken place, India has signed civil nuclear deals with more than half a dozen countries. Hence the most precarious lie advocated that India has a strong track record of nuclear safety for the materilisation of these nuclear deals. On the other hand, mainstream

media and western governments are constantly generating hype about the safety of Pakistan's nuclear weapons, whereas they are not concerned about highly startling conditions regarding the nuclear capabilities of India.

Now if we prefer to remain on the surface, some print and electronic media reports would lead us to believe that India has a strong nuclear non-proliferation track record. On the contrary, the highly alarming situation remains unnoticed. There is an unnoticed and largely ignored history of Indian illegal nuclear procurement, poor nuclear export controls and mismanagement of nuclear facilities. For instance, India diverted Canadian-supplied fuel for research and generating power to make nuclear weapons. But there is more to the nuclear programme than meets the unsuspecting eye.

Let us look at the nuclear safety first. There are numerous hazardous nuclear installations in India that could lead to a major disaster with extraordinary bearing on the lives of large populations around these facilities. According to the Australian newspaper, The Age, there is no national policy

In India, the constructions of nuclear facilities on coastlines are exposed to natural disasters like the monstrous tsunami of 2004. Beside the damage to the environment, there are numerous cases where workers were exposed to high radiation doses. There are 350 documented cases of radiation exposure that were reported at Tarapur, which is India's first nuclear station.

in India on nuclear and radiation safety. Despite all this, India has never strived to adopt world standards and best practices for nuclear safety. Radioactive wastes disposal in Indian rivers is an undocumented environmental tragedy in India.

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There are huge nuclear security issues in India because it is prone to insurgent groups and separatist rebels. According to the Daily Mail's reports, most of the India's top nuclear facilities are located in exceedingly Naxal terrorists'-struck districts of India or in the 'Red Corridor'. Some of the sensitive nuclear installations situated in this Red Corridor are: Uranium Corporation of India Limited, Talcher Heavy Water Plant, Institute of Physics, Ceramic Fuel Fabrication Facility, Nuclear Fuel Complex, Seha Institute of Nuclear Physic and Atomic Minerals Directorate. Around 90% of the Red Corridor areas are a No-Go-Zone for the Indian troops and Air Force. The Naxal rebels are in full control and there is no writ of the Indian government in these areas.

The shocking aspect of Daily Mail's reports is that Indian nuclear scientists are reportedly assisting Naxal rebels to learn to utilise and transport Uranium. On the other hand, India's maximum missile facilities are also located in either the Red Corridor or in the areas controlled by Hindu radicals and militant organizations. There are also reported cases of abduction of nuclear scientists from these areas, which is a very disturbing situation with respect to safety and security of nuclear weapons.

Any nuclear accident in India could have serious fallout on its neighbouring countries and hence the poor safety and security measures are of great concern. For instance, a nuclear weapon in the hands of Indian terrorists could lead to an accidental nuclear war between Pakistan and India. Likewise, an accident at a nuclear power plant could release radiation that may not respect any borders.

India has to take numerous steps to ensure safety of its nuclear programme....

Source: <http://www.dailytimes.com.pk/>, 24 September 2013

OPINION – The Asahi Shimbun

Abe Should Confront the Reality of Fukushima Radiation Leaks

In the wee hours of 20 September 2013, a strong earthquake measuring a 5-plus on the Japanese seismic scale struck Fukushima Prefecture. Its epicenter was in the Hamadori area in the eastern part of the prefecture, where the wrecked Fukushima No. 1 nuclear power plant is located. Even though it caused no damage to the some 1,000 storage tanks within the plant that are filled with radioactive water, the quake must have given many people a chill.

On the previous day, PM Shinzo Abe visited the crippled plant and reiterated his view about the effects of contaminated water, saying they had been "completely blocked" within a certain range. But he is overoptimistic if he really believes what he said about the problem. He needs to appreciate the seriousness of the situation and make an all-out effort to prevent unforeseen disasters like massive leaks of contaminated water. Symbolical of Abe's unwarranted optimism about what is going on at the plant is his claim that the situation is "under control."

He made the remark earlier this September 2013 in his presentation at a session of the IOC, which helped Tokyo

to be chosen as the host city for the 2020 Summer Games. After his statement was reported around the world, however, a senior executive of TEPCO, the operator of the Fukushima plant, rebutted his argument, saying the situation was not under control. During the IAEA's annual general conference meeting held in Vienna, representatives of many countries raised questions about Abe's statement. China, for instance, voiced strong concerns about how things stand at the Fukushima complex. Mindful of the international perceptions, Ichita Yamamoto, minister of science and technology policy, didn't use the phrase "under control" in his official speech at the IAEA meeting. We are not demanding that the PM describe the situation with complete accuracy. We are concerned that he may be confusing the goal with the reality. Efforts are certainly under way to put the radiation crisis "under control" and "completely block" the effects of polluted water. But that doesn't mean the situation is actually "under control" or that the effects are "completely blocked." At the moment, how much radioactive water is flowing into the sea and what underground route it is taking to reach the sea can only be guessed. That means the situation is far from being "under control."

The problem of radioactive water accumulating at the Fukushima plant has been recognized from the beginning. Why is it that no serious effort has been made to find a solution for as long as two years? British science magazine Nature takes a dim view of how the Japanese government, which has announced a plan to take over the cleanup, will cope with the crisis.

The PM's words carry great weight. If he voices an overoptimistic view about the current situation concerning leaks of contaminated water, the efforts to deal with the problem could be prematurely relaxed. One big mistake concerning the problem was made by the previous administration of PM Noda. In December 2011, the Noda administration declared that the Fukushima nuclear crisis had been resolved. But, in fact, only a stopgap

system to pour water continuously onto melted reactor cores had been established. As a result, the problem of polluted water accumulating at the plant dropped from the list of important topics of political debate and lost the attention of the general public.

News media should also do soul-searching over their failure to communicate the seriousness of the problem sufficiently to the public. At the IAEA meeting, one inevitable question was raised. The problem of radioactive water accumulating at the Fukushima plant has been recognized from the beginning. Why is it that no serious effort has been made to find a solution for as long as two years? British science magazine Nature takes a dim view of how the Japanese government, which has announced a plan to

take over the cleanup, will cope with the crisis. "Given the government's past actions and information policies, one might doubt whether it would be any more competent than TEPCO at managing the situation and communicating it to the public," it commented in a recent issue. The current situation of the crisis warrants no optimism. The Abe administration needs to honestly acknowledge the enormity of the challenge, and communicate its view and related information to audiences both at home and abroad. Then it should start taking steps to gain necessary knowledge and support from all over the world to tackle the challenge effectively.

Source: <http://ajw.asahi.com/>, 21 September 2013.

NUCLEAR STRATEGY

CHINA

Development of China's Fourth-Generation Nuclear Submarine Completed

At the recent 2013 Four Northeastern Provinces Cooperation Leaders' Conference held in Ordos, Inner Mongolia, Tan Zuojun, vice governor of Liaoning Province and former general manager of China State Shipbuilding Corp, revealed that development of China's fourth-generation nuclear submarines and other high-tech weapons and items of equipment in the North-eastern Provinces of China had been completed....

The fourth generation nuclear submarine features high performance and low noise ... the main characteristic of the fourth generation nuclear submarine would be its high performance. Compared with earlier submarines, modern attack submarines differ significantly in offensive power, possessing both anti-submarine capabilities and also strong potential for anti-ship action and attacks on land-based targets. He pointed out that the fourth generation nuclear submarines of the US and Russia already have these capabilities; China's fourth-generation nuclear submarines too will be equipped with the appropriate torpedoes, along with missiles suitable for use against other sea-going or land-based targets. In addition, the Chinese submarine will have low noise output, a key indicator for measuring a modern nuclear submarine's underwater survival capacity, as well as its ability to

The fourth generation nuclear submarine features high performance and low noise ... the main characteristic of the fourth generation nuclear submarine would be its high performance. Compared with earlier submarines, modern attack submarines differ significantly in offensive power, possessing both anti-submarine capabilities and also strong potential for anti-ship action and attacks on land-based targets.

remain hidden during maneuvers, or undetected while launching an attack. He pointed out that the fourth-generation nuclear submarine will possess effective noise damping features, such as quieter nuclear power plant with less vibration, and a more advanced hull muffler system, so that it will be difficult to detect even if within range of enemy sonar.

On the question when the fourth generation nuclear submarine will enter service, DuWenlong said that

completion of development and completion of construction are two different phases - the cycle from completion of development to manufacturing, and then to fitting out and launch, can be very long, perhaps several years. Progress is determined by two factors: one is technical indicators, and the other is strategic need.

Analysts believe that continual development of attack submarines and strategic nuclear submarines at times of peace, adding better performance and greater combat ability, can enhance strategic deterrence capability. China's strategic nuclear forces are weapons to deter third parties from becoming involved in local conflicts. China firmly adheres to the principle of non-first use of nuclear weapons, but the existence of strategic nuclear submarines will give China a stronger voice and more room for maneuver in the case of any crisis. In addition, Song Xiaojun points out that the US, Russia, Britain and France all possess modern strategic nuclear submarines as a symbol of their status as 'Great Powers'; it is natural that China should be unwilling to lag behind.

Source: <http://english.peopledaily.com.cn/>, 22 September 2013

INDIA

India Tests Nuclear Capable Missile with Range As Far As Beijing

India successfully test-fired for a second time a nuclear-capable missile on 15 September 2013 that can reach Beijing and much of Europe, bringing a step closer production of a weapon designed to strengthen its nuclear deterrent. "The test was successful," said Ravi Kumar Gupta, spokesman for the DRDO. "It hit the target in a predefined trajectory. It met all the mission

India successfully test-fired for a second time a nuclear-capable missile on 15 September 2013 that can reach Beijing and much of Europe, bringing a step closer production of a weapon designed to strengthen its nuclear deterrent.

objectives” A video distributed by the DRDO showed the Agni-V rocket blasting off from a forest clearing on an island off India’s east coast state of Odisha... The Agni-V is the most advanced version of the indigenously built Agni, or Fire, series, part of a programme that started in the 1960s. Earlier versions could reach old rival Pakistan and western China.

Nuclear-armed Pakistan is increasing its arsenal of nuclear warheads and developing short-range, tactical nuclear weapons, raising concern about an escalating South Asian arms race, the IISS said on 12 September 2013. The think-tank said in a report the race with Pakistan was increasing the risk of a nuclear exchange during a conventional conflict, perhaps sparked by an act of terrorism. The Agni-V missile was first tested in April 2012. It is mostly domestically built and has a range of about 5,000 km (3,100 miles). Only the UNSC permanent members - China, France, Russia the US and Britain - along with Israel, are believed to have such long-range weapons. Gupta said India was now ready to start a process of production and subsequent induction of the missile.

Source: <http://in.reuters.com/>, 15 September 2013

USA

Clock Is Ticking on Aging B61 Bomb, Stratcom Chief Says

The oldest atomic bomb in the US arsenal desperately needs to be upgraded before its aging electronics go bad early in the next decade, the head of the Offutt-based U Strategic Command says. Gen. C. Robert Kehler has been telling anyone who will listen that the clock is ticking on the B61 bomb. It was designed in the 1960s to be dropped from NATO’s strategic bombers and tactical fighters, thwarting a Soviet invasion of Western Europe. “The B61 life-extension program is absolutely necessary,” Kehler said in an interview with The World-Herald. “Much has been deferred. Now we don’t have the luxury of waiting.” But congressional opponents on the right and left are lining up against the program, citing cost estimates that have doubled in just two years to more than \$28 mn/ bomb. As anti-nuclear activists are fond of pointing out, that’s about twice what it would cost if the B61 were made of solid gold.

What’s more, the battle looks like a precursor to a much larger one over the planned retooling of America’s nuclear weapons as well as the missiles, submarines and aircraft that carry them. The projected price tag for some of those

upgrades already stands at \$65 billion, even as the Pentagon enters an era of tight spending. “The B61 is the first in that queue,” said Kingston Reif, director of nuclear non-proliferation at the Center for Arms Control and Non-Proliferation in Washington, D.C. “There’s concern about whether these plans make any sense.” About 180 B61s are deployed at NATO air bases in Europe for tactical use to blunt a Russian attack, according to calculations by Hans Kristensen, director of the Nuclear Information Project at the FAS. An estimated 250 more are in place to arm B-52 and B-2 strategic bombers in North Dakota and Missouri, he said, and an additional 500 are inactive.

After decades of storage, though, some of the electronic parts have grown obsolete and unreliable. The Pentagon wants to upgrade the four aged B61 types into a single new one called the B61-12. “Some of the components are so old, they can’t be replaced,” said Michaela Dodge, defense and strategic policy analyst at the conservative

Heritage Foundation, who supports the upgrade. “We are facing a very serious situation when it comes to nuclear weapons.” President Barack Obama has championed the B61 upgrade in spite of his frequently stated goal of reducing nuclear weapons. In 2010, he asked Congress to spend \$4 billion over 10 years to refurbish 400 of the bombs as part of the larger program to

President Barack Obama has championed the B61 upgrade in spite of his frequently stated goal of reducing nuclear weapons. In 2010, he asked Congress to spend \$4 billion over 10 years to refurbish 400 of the bombs as part of the larger program to modernize the nuclear arsenal.

modernize the nuclear arsenal. He agreed to boost spending on the modernization plan to win the support of Senate Republicans that year for the extension of the START that Obama had negotiated with the Russians, analysts say.

The plan pitched by the NNSA, which manages the country’s nuclear stockpile, would do more than just replace obsolete parts of the B61. It also would add certain security features that backers say would make the bomb safer even if it fell into the wrong hands, although critics contend those features are unnecessary. And it would retrofit the bomb so it could be used with the new F-35 fighter jet. Significantly, it would add a guided tail kit that would turn the B61 from a gravity-dependent “dumb” bomb into a “smart” one that could be aimed more precisely at a target. “The big plus to the -(B61-)12 is the additional precision guidance,” said Barry Watts, a retired Air Force .. “The anti-nuclear groups look at it as a new capability, a new warhead.”

Arms-control advocates have argued the B61-12 upgrade violates Obama’s 2010 nuclear strategy, which pledged

not to add military capabilities when upgrading nuclear weapons.

The trouble with that strategy, Watts said, is that the US arsenal is full of larger weapons designed for a massive Cold War confrontation with the Soviets. Now, though, the Russians and other nations in the nuclear club are focusing on smaller, tactical weapons designed to take out armies instead of cities. Watts believes the US emphasis on reducing weapons is misguided...

The escalating cost of the B61 upgrade has inspired some Tea Party conservatives in Congress to join forces with nuclear skeptics on the left. By 2012, cost estimates had more than doubled, to \$10.4 billion. Kristensen has called it the "most expensive nuclear bomb project in history." "It's a huge budget-buster," said Reif, from the Center for Arms Control and Non-Proliferation. Members of Congress are beginning to cut back the B61 program. The current year's budget sequester already reduced appropriations for the project by about 20%. For 2014, congressional subcommittees that oversee the nuclear stockpile budget are threatening to cut the Obama administration's \$537 million B61 request by about one-third.

The tug of war is frustrating for Sen. Deb Fischer of Nebraska, who has spoken up for StratCom's priorities from her position on the Senate Armed Services Committee — which, she said, has fully supported the president's B61 plans. "Cost growth and schedule slips are serious issues, and another year of sequestration cuts will only exacerbate these problems," she said in a statement released from her Washington office. "As these issues compound, and the weapons continue to age, we approach the possibility that our military may not have this critical tool at its disposal. I hope Congress acts before this point is reached." Kristensen, however, said he hopes the cuts imposed by Congress will force the Obama administration to look at lower-cost alternatives to the souped-up B61-12. "How exotic do you need to make the upgrade?" he said. "There are cheaper ways to do these things." Kristensen has proposed one such plan. His idea is to upgrade only one of the four current models, the B61-7, of which about 215 are deployed in the US. That would fix three of the most critical aging components, skipping the F-35 compatibility upgrade and the expensive guided-tail kit.

He estimates the B61-7 alternative would cost no more than \$2 billion, or one-fifth as much as the current plan.

His plan also would remove all the weapons from Europe, because the versions used there would not be upgraded. In his view, that's a plus. Anti-nuclear groups in Western Europe have long opposed the presence of the weapons there, and Kristensen sees the threat of a Russian attack as remote. President George W. Bush already had cut the number of warheads in Europe by half... There is not much time to delay. Under the current schedule, the first of the upgraded B61s are scheduled to be ready in 2019 — just as the old ones are expected to age out. And with critical nuclear upgrades planned for missiles and their delivery systems in the coming decades, the military says it can't afford to slow down now. "We have a series of life-extensions that need to occur in order here," Kehler said. "And now is the time to get moving."

Source: Excerpted from <http://www.omaha.com/>, 23 September 2013.

BALLISTIC MISSILE DEFENSE

USA

Lockheed Martin Clinches \$4 Bln Pentagon Missile Defense Deal

The Pentagon said on 20 September 2013 it had finalized a contract worth nearly \$4 bn with Lockheed Martin Corp(LMT.N) to supply additional missile defense equipment to the US and the UAE. The deal involves Lockheed's THAAD missile defense system that is designed to intercept ballistic missiles in midair, according to the Pentagon's daily digest of major weapons contracts. The contract reflects growing confidence

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and demand for the missile defense system, said Riki Ellison, founder of the non-profit MDA. The deal, which has been in negotiation for several years, will combine orders for the US and UAE, generating savings for the US of about 10% , said Mat Joyce, Lockheed vice president and THAAD program manager. It includes 192 interceptors for the UAE and up to 110 interceptors for the US Army, including an option for fiscal 2014 that is valued at \$352 million, to be exercised no later than 31 December 2013, according to the Pentagon announcement. Joyce said the option would allow the US government to benefit from the lower pricing at a time when it is facing likely additional reductions in the US defense budget.

The US is in talks with Qatar on a possible sale of the THAAD missile defense system. Saudi Arabia, Japan and South Korea have also expressed interest, Joyce said. The US MDA in the third week of September 2013

conducted the first operational test of the THAAD system and its ability to work together with the Aegis combat system on a guided-missile destroyer. Working together, the two systems intercepted two medium-range ballistic missile that were fired nearly simultaneously. Earlier in 2013, after North Korea threatened to launch a nuclear attack on the US, the Pentagon moved two Aegis destroyers to the western Pacific and a THAAD missile system to its Pacific territory of Guam.

Source: <http://www.firstpost.com/>, 22 September 2013

Aegis System Intercepts Ballistic Missile

A short-range, separating ballistic missile target was intercepted nearly simultaneously by two SM-3 Block IB guided missiles, officials said. The test of Lockheed Martin's second-generation Aegis Ballistic Missile Defense Weapons System, using the USS Lake Erie, was conducted at sea by the company, the US MDA and the US Navy. Lockheed said the intercepted missile was the most sophisticated target to date to test the system, which is equipped with the SPY-1 radar. The Aegis system and SPY-1 radar provide the US and allied nations with advanced surveillance, anti-air warfare and missile defense capabilities.

"This latest test is the first time we have seen USS Lake Erie, sailors, and Aegis BMD Weapon System schedule, analyze, launch and control multiple missiles in flight through intercept at the same time," said Nick Bucci, Director of BMD Development Programs at Lockheed Martin's Mission Systems & Training business. "The Aegis BMD 4.0.2 configuration provides the Navy with the ability to respond to ever increasing and evolving ballistic missile threats around the world with persistent and reliable capabilities." The MDA and US Navy are jointly developing Aegis BMD as part of the US BMD System. So far 27 Aegis BMD-equipped warships have the certified capability to engage ballistic missiles. Four ships in the JMSDF are also equipped with the system.

Source: <http://www.upi.com/>, 19 September 2013.

NUCLEAR ENERGY

CHINA

China Designs N-Reactors with Developing Countries in Mind

...China has made a case for its new, domestically-developed, 4th generation reactor as the answer for developing countries' concerns regarding costs and safety. The State-run CNEC closely involved in the design and construction of many of the 17 nuclear reactors in operation, on 15 September 2013, presented designs of

its new fourth-generation HTR and HTGR, on the sidelines of the first China-Arab States trade exposition which opened in this western Chinese city. With global interest in nuclear power waning following Fukushima, the CNEC is hoping that success with its reactor will help rekindle interest abroad. The CNEC has been charged by the State Council, or Cabinet, with expanding the nuclear industry's reach overseas. The company was behind the Chashma-3 and Chashma-4 reactors in Pakistan. The deals triggered controversy because they were agreed to after China joined the NSG.

Since those deals, the CNEC has struggled to make headway overseas following the Fukushima incident and IPR concerns over some models, such as the Westinghouse-inspired 1000 MW reactors, over which China and Pakistan have had recent talks. The company is banking on the HTR design as the answer to both concerns. "The HTR reactor, which is fourth-generation, is one for which we have complete IPR so we can freely export this reactor," Zhang Wei, CNEC's Chief Engineer, told The Hindu.

Zhang also said the CNEC had initiated talks with countries ranging from South Africa and the UAE to Cambodia, to export its reactors. Zhang said the HTR was also much safer, with its inherent structural design ruling out a recurrence of a Fukushima-type incident. In October 2013, China gave the green light to restarting construction of reactors after a more than a year-long suspension, during which a safety review was conducted in the wake of Fukushima. China is building 28 reactors – more than in any other country – with most of the projects entirely designed and constructed domestically, using technology adapted from the US, France and Russia.

Source: <http://www.thehindu.com/>, 16 September 2013.

INDIA

India Plans 16 More Heavy Water Reactors

Indian nuclear power plants posted their highest performance in 2012, Department of Atomic Energy chief R K Sinha told IAEA recently. From the time when Indian power plants had to close because they did not have enough fuel, these have come a long way, because after the nuclear deal, Indian plants have been able to access fuel from overseas.

India is planning to build 16 more pressurized heavy water reactors. India plans to produce 63,000 MWe nuclear power by 2032, according to official figures.

Source: [The Times of India](http://www.thehindu.com/), 24 September 2013.

Cabinet Clears Nuclear Liability Clause Ahead of PM's UNGA Visit

In a move which is likely to evoke sharp reaction from the Opposition, the CCS cleared the contentious Nuclear Liability Clause, paving way for signing of an agreement between NPCIL and America's Westinghouse. The controversial clause was cleared hours ahead of PM Dr Manmohan Singh's departure for the US to attend the UN General Assembly meet, reports said on 25 September 2013. The clause dilutes the Nuclear Liability Law by which NPCIL will have the right to recourse in case of a nuclear accident. It was also reported that clause was cleared on the basis of Attorney General GE Vahanvati's interpretation of the deal which states that the right to recourse in case of a nuclear accident lies with India. Opposition had taken the government on over the issue claiming that it was making attempts to exempt US suppliers of reactors from the liability clause and thus bypassing the law passed by Parliament.

Owing to Opposition's protest, the CCS met last the third week of September 2013 to deliberate on the clause, which according to the opposition parties, was not in tune with the law. The US also saw the Civil Liability for Nuclear Disaster Act as hurdle in selling nuclear reactors to India. The law passed by the Parliament empowered NPCIL to seek partial compensation from suppliers if their reactors are involved in a nuclear accident. However, in an opinion to the DAE, Attorney General G E Vahanvati stated that it is up to the nuclear plant operator to invoke section 17 of the Act regarding liability of suppliers in case of a mishap. It is this interpretation of the A-G that provided the basis for the Union cabinet to clear the clause. In order to placate the Opposition, the Centre had maintained India is not going back on the deal. "There is no question that we will go back on the Nuclear Liability Bill," said EAM Khurshid.

The agreement will allow two sides to begin negotiations taking into account all the opposition to the Civil Nuclear Suppliers Liability Clause from the US. While the government denies changes, it allows NPCIL to change course in case of an accident. It will allow them to continue negotiations on the 6,600 MW plant in Gujarat. The development is significant as it coincides with PM Singh's

meeting with US President on 27 September 2013. The cabinet clearance is also being seen as an attempt to show that the India and US rapport hasn't hit a plateau. During the meeting, the two leaders are expected to discuss implementation of the civil nuclear deal, ways to expand cooperation in the fields of defence, security and economic issues.

Source: <http://zeenews.india.com/>, 25 September 2013.

URANIUM PRODUCTION

AUSTRALIA

Call To Store Nuclear Waste to Sustain Uranium Industry

Australia will need to start enriching uranium and storing the nuclear waste if it is going to sustain a competitive uranium industry in the future, says senior finance and resources figure Mark Johnson. Johnson, a former deputy chair of Macquarie Bank and former chairman of AGL, said Australia had a "great opportunity" to become a participant in a "free world nuclear fuel cycle", if it produces uranium...

...The price of uranium has halved since governments around the world promised to cut their reliance on nuclear power following the Fukushima nuclear disaster. Energy Resources Australia chief executive Rob Atkinson said the market will turn, particularly given expected

demand from China. For other democracies, nuclear power is "off the table for generations", Johnson said, prompting suggestions that enrichment and storage of waste will be a key part of expanding the industry.

Australia currently processes uranium to the "yellow cake" stage, which is then exported for further processing and concentration, and in some cases turned into fuel rods. Uranium as a fuel source can only be used for about three years before it becomes too unstable, said Australian Conservation Foundation nuclear campaigner Dave Sweeny. He said making Australia part of the global fuel cycle was about opening the country up for return of that spent material. "Industry returns are meagre and the risks are significant and continuing," he said.

Source: <http://m.afr.com/>, 23 September 2013.

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NUCLEAR COOPERATION

INDIA – USA

Before PM’s US Trip, India Rushes To Ready Nuclear Deal

India is making a last-minute push to close a nuclear deal in time for a meeting between US President Obama and PM Singh, who has made atomic energy cooperation with Washington a hallmark of his tenure. Under the proposed deal, India would contract Toshiba’s US nuclear unit Westinghouse for preliminary works, including information sharing. The aim is to build nuclear plants in the state of Gujarat. “I think we’re close,” NSA Shivshankar Menon said on 20 September 2013. “I think they’re hoping to do a pre-early works, which involves some transfer of proprietary information.” Singh is due to meet Obama in Washington on 27 September 2013... After US Secretary of State John Kerry raised the issue on a trip to India in June 2013, the company said it expected the agreement to be finalised in September 2013.

The value of the preliminary contract has not been revealed. Indian officials say the proposed deal between Westinghouse and NPCIL would be the first time money is committed to a commercial US nuclear supplier since Singh staked his career on a civil nuclear pact with US President George W. Bush 2008. A commercial contract, however small, could breathe life into Singh’s flagship policy as he nears the end of a decade in office amid grumbling in Washington that ties with India have failed to deliver rewards for US businesses. Many see the 2008 pact as Singh’s crowning achievement, in one stroke ending years of isolation following atomic weapons tests in 1974 and 1998 and heralding a new era in the often fraught relations between the two democracies. But on the nuclear front, progress has been slow because laws governing liability in the case of accidents took several years to finalise and when they came, put the onus on the equipment suppliers. “Not just the US, ... Indian domestic suppliers, other foreign partners, all ask questions: how will this law work? How will it apply?” Menon said.

Rules drawn up in 2011 limit the liability of suppliers and were seen as softening the law. The preliminary deal with Westinghouse would not involve putting in place nuclear equipment, so would not immediately brush up against the liability issue. Westinghouse has

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India aims to lift its nuclear capacity to 63,000 MWs in the next 20 years by adding nearly 30 reactors. It currently operates 20 reactors at six sites with a capacity of 4,780 MW, or 2% of its total power capacity, according to NPCIL.

safety approval from US nuclear authorities for the AP 1000 reactor it wants to sell India. The preliminary deal must be cleared by two Indian committees before Singh leaves for the US on 25 September 2013, two Indian officials said, asking not to be named. “The two governments have resolved government to government permissions and

understandings necessary to enable commercial negotiations between NPCIL and Westinghouse,” Menon said. A third official said the Westinghouse deal would show foreign nuclear suppliers that India was committed to doing business with them. ...

The last-minute dash for clearance has been criticized by Indian opposition parties, who accused the government of trying to bypass due process and water down the liability law. After a TV station reported on 19th September 2013 that a note from the PM’s office suggested skipping the approval of one committee to get the deal ready in time, the opposition BJP said the government wanted to “give a gift” to US companies. India’s DAE issued a statement denying any shortcuts were being considered. India aims to lift its nuclear capacity to 63,000 MWs in the next 20 years by adding nearly 30 reactors. It currently operates 20 reactors at six sites with a capacity of 4,780 MW, or 2% of its total power capacity, according to NPCIL.

Source: Frank Jack Daniel and Matthias William, Reuters, 21 September 2013.

RUSSIA–IRAN

Tehran, Moscow Agree to Build New Nuclear Power Plant– Iran’s Nuclear Chief

Tehran and Moscow will cooperate on the future construction of a new nuclear power plant, according to Iranian nuclear chief Ali Akbar Salehi. The news comes as Russia hands over operational control of the first unit of the Bushehr nuclear plant to Iran. “The operation of the Bushehr nuclear power plant from this day has been passed to Iranian specialists and will come under full control of the Iranian side after a two-year warranty period or seven thousand hours of work,” said the head of the AEOL, Ali Akbar Salehi... He noted that Russian experts would remain at the facility throughout the two-year warranty period.

“Should any problem arise the Russian contractor is responsible for

removing it," he said. Moscow has also agreed to provide the Iranian facility with fuel for 10 years. The supply deal commits Tehran to returning the spent fuel. Salehi said that in the near future, Tehran is expecting the construction of a second unit of the Bushehr nuclear power plant.

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"During the last meeting of the intergovernmental commission on economic issues of Iran and Russia both parties reached an agreement on the construction of new nuclear power plant. ... the two countries are continuing negotiations on the issue of building new facilities and said "construction work is to start soon." Tehran is open to nuclear energy collaboration, said Iranian President Hassan Rouhani in a statement dedicated to the...The 1,000-MW plant in Bushehr is located approximately 1,200 kms south of the capital. In June 2013, the first unit was launched at 100% capacity.

The Bushehr nuclear power plant has no link to nuclear weapons production and cannot be used to develop such technology. The facility has never been and is not subjected to international sanctions, as the construction was carried out under the supervision of the IAEA. Nevertheless, some Western countries - mainly the US and Israel - believe that Iran's nuclear ambitions are aimed at developing weapons, and suggest imposing new sanctions on the Islamic Republic in addition to existing restrictions on the economy. The countries want the new sanctions to target investments in oil, gas and petrochemicals, and exports of refined petroleum products, among other things.

Iran and the P5+1 group – the US, UK, Russia, China, France, and Germany - have held several rounds of talks on Tehran's nuclear energy program, but have not yet come to an agreement. Iran says its nuclear program is targeted at developing energy and medicine, and that the country has the right to use nuclear technology for peaceful purposes.

Source: <http://rt.com/>, 23 September 2013.

RUSSIA – USA

USA and Russia Expand Nuclear Energy Research Ties

The US and Russia have signed a joint agreement to share their knowledge on nuclear energy,

The US and Russia have signed a joint agreement to share their knowledge on nuclear energy, research and security projects. The agreement will expand co-operation between the two countries on nuclear research laboratories, institutes and facilities in a broad range of areas, including nuclear technology, energy and environment. It will add on to the US-Russia Agreement for Co-operation in the Field of Peaceful Uses of Nuclear Energy which came into force in January 2011.

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Field of Peaceful Uses of Nuclear Energy which came into force in January 2011. A Multi-Purpose Fast Reactor International Research Centre could be established as part of the new agreement. US Energy Secretary Ernest Moniz said: "This Agreement supports President Obama's non-proliferation and climate priorities by providing a venue for scientific collaboration and relationship-building between the US and Russian research and technical communities. Jointly, these communities will work to further develop advanced technologies that can address some of our most pressing nuclear energy and nuclear security challenges." The countries will each pay for their own share of projects under the agreement. Earlier this 2013, the US also joined forces with the Czech Republic for a joint civil nuclear co-operation centre in Prague while Russia signed an agreement with the UAE for cooperation in the use of nuclear energy for "peaceful purposes" in 2012.

Source: <http://www.energylivenews.com/>, 19 September 2013

NUCLEAR PROLIFERATION

IRAN

Iran Insists on Keeping Some Nuclear Technology If the World Wants Them to Not Create Bombs

There is little doubt that if it came to war between Iran and the forces in the US and Israel that Iran would lose, that they would suffer huge losses and casualties and end up a destroyed nation. That is pretty much a given provided those two countries went full bore, because Iran just could not stand up to such an assault. That, though, seems an unlikely scenario even in the most extreme of imaginings. While those two powers have made it clear that they will not allow Iran to acquire nuclear weapons, and that they are willing to go to war to back up such a pledge,

much of that has ended up as posturing that has gone nowhere. Despite all those threats, and sanctions specifically punishing the pursuit of nuclear technology, Iran has continued to pursue it with little or no trouble at all. The country has not developed nuclear weapons but they have driven forward on enriching uranium and building power plants, which they have insisted is all they want. Now the new President has laid it on the line and made it clear that they need to be allowed to keep pursuing nuclear power technology or else they will just create a bomb and then it will just be too darn late for everyone.

"The Iranian people want development and are not looking to make an atomic weapon. If they accept these rights, the Iranian people are a rational people, peaceful and friendly. We stand ready to cooperate and together we can settle all the region's problems and even global ones," said Hassan Rouhani on 22 September 2013. Rouhani has sort of agreed to have a conversation with US President Obama about the nuclear issue but seems to have set down parameters for that in advance. The two might meet the last week of September 2013 at the UN or might not, depending on how things go....

Iran has insisted all along that they only want nuclear technology for peaceful purposes but of course no one has believed them. "I would imagine that ultimately we are going to end up with some kind of agreement that allows Iran to have nuclear power plants since they already do have that and the world has already pretty much allowed them to have them and you can't really take something like that away," continued Hander. "I don't know that trying to bluff these guys who are threatening them is the best way to go about things but so far saying crazy things hasn't really hurt them so maybe they know what they are doing, maybe, I guess we will just have to wait and see." US officials have not responded in any way yet.

Source: <http://scrapetv.com/>, 22 September 2013.

Iran Nuclear Energy Program Has No Military Aspect: Putin's Chief Of Staff

Russian President Putin's chief of staff has stressed the peaceful nature of Iran's atomic activities, saying Tehran's nuclear energy program has no military aspects.

Sergei Ivanov made the remarks in a meeting with Iranian lawmaker Mehdi Sanaei on 19 September

Putin's chief of staff said he has been directly engaged in the Iranian nuclear case for the past couple of years and has never seen any evidence proving a diversion to military aspects in Iran's nuclear energy program.

2013, IRNA reported... Iran's nuclear energy program is diverted to military objectives are untrue. Putin's chief of staff said he has been directly engaged in the Iranian nuclear case for the past couple of years and has never seen any evidence proving a diversion to military aspects in Iran's

nuclear energy program. The US, Israel and some of their allies have repeatedly accused Iran of pursuing non-civilian objectives in its nuclear energy program. Iran has categorically rejected the allegation, stressing that as a committed member of the IAEA and a signatory to the NPT, it is entitled to develop nuclear technology for peaceful purposes. Sanaei underlined that Iran is a supporter and one of the key guardians of peace and stability in the region, adding that Tehran's nuclear activities were based on its rights and obligations stipulated in the NPT. Moreover, a decree by Leader of the Islamic Revolution Ayatollah Seyyed Ali Khamenei, which forbids the production, stockpiling and use of nuclear weapons, leaves no reason for Iran whatsoever to deviate from its peaceful nuclear work, the Iranian MP added.

He said Iran is determined to exercise its legal right to peaceful nuclear technology under international rules and regulations....

Source: <http://www.presstv.ir/>, 19 September 2013.

Iran Not After Nuclear Weapons: Ayatollah Khamenei

Leader of the Islamic Revolution Ayatollah Seyyed Ali Khamenei has reiterated Iran's opposition to the possession of nuclear weapons based on the beliefs of the Iranian nation. "We are against nuclear weapons not because of the US or others, but because of our beliefs," Ayatollah Khamenei said in a 17th September meeting with the commanders and officials of the IRGC. "And when we say no one should have nuclear weapons, we definitely do not pursue it ourselves either," the Leader said, noting that Iran's opponents pursue other motives in the dispute over Iran's nuclear energy program. Ayatollah Khamenei noted that a few countries do not want their monopoly on the nuclear energy to be challenged, but they do not make their real intention public. The hue and cry by the United States, West and their allied currents regarding the nuclear issue must be perceived and analyzed within the framework

Leader of the Islamic Revolution Ayatollah Seyyed Ali Khamenei has reiterated Iran's opposition to the possession of nuclear weapons based on the beliefs of the Iranian nation. "We are against nuclear weapons not because of the US or others, but because of our beliefs," Ayatollah Khamenei said.

of the deep-seated challenge between the hegemonic system and the Islamic Revolution, the Leader said.

Ayatollah Khamenei went on to note that the main message of the Islamic Revolution is to avoid doing injustice to others as well as standing up to oppressors. 'The main challenge [between Iran and the West] is the confrontation between the hegemonic system and the encouraging message of the Islamic Revolution, which is to avoid oppressing others and being oppressed.' The Leader also stated that the Islamic Revolution has offered a new order to humanity. Ayatollah Khamenei said hegemonic powers have "divided the world into two sections of the oppressors and the oppressed," while the Islamic Revolution has introduced the logic of fighting against oppression and refraining from doing injustice to others. 'Due to this logic, the message of the [Iranian Islamic] Revolution has not remained contained within Iran's borders and has been welcomed by nations,' the Leader said.

The Leader also described tyrannical governments and their allies, and international plundering networks as the main adversaries of the Islamic Revolution's message. 'The hegemonic system and its affiliates pursue three main policies of warmongering, creating poverty and stirring corruption, and Islam is opposed to all these policies, and this opposition is the bedrock of the basic challenge with the [Islamic] Revolution,' Ayatollah Khamenei said.

Source: <http://www.globalsecurity.org>, 17 September 2013.

NORTH KOREA

North Korea Learning to Make Crucial Nuclear Parts, Study Finds

North Korean scientists have learned to produce crucial components of gas centrifuges inside their isolated country, undermining years of export controls and sanctions intended to stop the country's enrichment of uranium for nuclear weapons, according to an analysis by two American arms control experts made available on 23 September 2013. The analysis comes as experts have reported other signs that North Korea is activating or expanding its nuclear production facilities. Taken together, they suggest a new effort by the North to master all the facets of the nuclear production cycle — or perhaps to

give the impression of nuclear progress that would drive new offers of talks or economic aid, in the view of some analysts.

The new study focuses on production of advanced centrifuges, a technically difficult feat that the US and others have tried to make harder for the North with a network of sanctions and bans on the export of sophisticated parts and metals. If the North Koreans are successfully making their own parts, they would essentially invalidate much of the international strategy to force them to denuclearize and make it more difficult to monitor their production progress. "That means, unfortunately, that we won't be in a good position to spot them expanding the program through foreign shopping expeditions, and that policies based on export controls, sanctions and interdiction won't get much traction, either,"

said Joshua Pollack, one of the experts presenting the findings this last week of September 2013. "The deeper implication, if they are able to expand the program unchecked, is that we'll never be too confident that we know where all the centrifuges are. And that in turn could put a verifiable denuclearization deal out of reach."

Pollack's findings in collaboration with Scott Kemp, an expert on centrifuge technology at M.I.T., will be presented on 25th September during a conference organized by the AIPS in Seoul. Mr. Pollack said he

and Dr. Kemp had analyzed such open-source data as scientific journals, news reports and propaganda from North Korea to find evidence that the country is learning — or has already learned — how to make such crucial centrifuge components and related technologies and materials as uranium hexafluoride, vacuum pumps, frequency inverters, magnetic top bearings and maraging steel. He said that domestic production appeared to have begun no later than 2009. North Korea shocked the US in 2010 when its officials escorted a visiting American nuclear expert, Siegfried S. Hecker of Stanford University, to their main nuclear complex in Yongbyon, north of Pyongyang. There, they showed him a modern plant that they said housed 2,000 gas centrifuges, a technology that North Korea said it would use to enrich uranium for reactors but that American officials feared was a cover for making highly enriched uranium for atomic bomb fuel. Until then, the North's sole source of weapons fuel had

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been plutonium gleaned from the waste of a mothballed nuclear reactor in Yongbyon.

Then, in 2013 April, at the height of tensions incited by the North's nuclear test in February 2013, the country declared that it would "adjust and alter the use of the existing nuclear facilities" for "bolstering up the nuclear armed force both in quality and quantity." It said that included immediately restarting the Yongbyon facilities. In August 2013, the ISIS in Washington cited satellite images to report that North Korea appears to have doubled the size of the building that housed the uranium enrichment plant in Yongbyon in recent months, and raising concerns that its enrichment capability would grow along with it. In September 2013, another monitoring group, the US-Korea Institute at Johns Hopkins University, cited satellite photographs showing steam emerging from the Yongbyon reactor, suggesting that the North was following through on its vow to resume plutonium production.

South Korean officials declined to comment on the American scholars' findings or on the North's centrifuge capabilities in general. Kang Jung-min, a nuclear scientist at the KAIST who said he was familiar with the work by Dr. Kemp and Mr. Pollack, said he agreed with their analysis. Mr. Hecker, the Stanford professor, said he agreed for the most part with the analysis, though he said it was still unclear whether North Korea can indigenously produce the high-strength grades of maraging steel used in the rotor-tube of a centrifuge — one of the most difficult steps in centrifuge production. "Having said that, if North Korea does indeed double the size of its Yongbyon centrifuge plant (all we know so far is that the roof is now expanded by a factor of two), then the likelihood of indigenous fabrication of maraging steel has increased," Mr. Hecker said in an e-mail interview. Since Mr. Hecker's visit to Yongbyon in 2010, he and other experts have said that North Korea was likely to have produced and hidden many more centrifuges elsewhere in the country. Unlike the North's old plutonium program, which involved a highly visible nuclear reactor,

In 2011, the mass-circulation daily Chosun Ilbo of South Korea quoted an anonymous defector from North Korea as saying that the country had been building centrifuges in Huichon, an industrial town about 35 miles northeast of Yongbyon, since the late 1990s. He said the North had imported the motors for centrifuges from such countries as Japan, France and Russia.

centrifuge plants are relatively easy to hide, they say.

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and Russia. How to ensure that North Korea does not lie about the scale of its nuclear weapons program was a central dispute behind the collapse of six-nation talks aimed at ending the North's nuclear weapons programs in late 2008. That dispute will be harder to settle if the North can produce centrifuges indigenously. North Korea and its main ally, China, have recently tried to reconvene the six-nation talks. But the US and its allies have said they will resume the talks only if the North agrees to eventually give up its nuclear arsenal.

As evidence to back up their analysis, Mr. Pollack and Mr. Kemp cited photographs of Kim Jong-il, the North Korean leader who died in 2011, and his son and the current leader, Kim Jong-un, visiting underground tunnels to inspect increasingly sophisticated machine tools of the kind needed to make centrifuge rotors. They also cited accounts of iron- and steelmaking technologies in North Korean publications, as well as scientific reports and patent awards that they said described work on centrifuge production. Mr. Pollack said that domestic production of centrifuge components might explain why American officials were caught off guard when the North unveiled its centrifuge plant in Yongbyon in 2010 and why North Koreans seem to have been able to expand the plant lately

despite few indications of shipments of specialty steel and other imports from the outside in recent years. "The most likely answer is, by producing the necessary components and materials at home," he said.

Source: The New York Times, http://mobile.nytimes.com/2013/09/24/world/asia/north-korea-learning-to-make-crucial-nuclear-parts-study-finds.html?pagewanted=all&_r=23, 23 September 2013.

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NUCLEAR NON PROLIFERATION

ARAB STATES

Arab States Call On Israel to Join Global Anti-Nuclear Weapons Treaty

Arab states will push ahead with a bid to single out Israel for criticism over its assumed atomic arsenal at the UN nuclear agency meeting, despite Western pressure to refrain, a senior representative said on 20th September. Frustrated over the indefinite postponement in 2012 of an international conference on banning atomic arms in the region, Arab states have proposed a non-binding resolution expressing concern about "Israeli nuclear capabilities". If adopted at the annual member state gathering of the UN IAEA, it would call on Israel to join a global anti-nuclear weapons treaty and place its nuclear facilities under IAEA monitoring. Diplomats expect a close vote. The US said this third week of September 2013 the move would hurt broader diplomatic efforts towards creating a Middle East zone free of weapons of mass destruction. Israel said it would deal a "serious blow" to any attempt to hold regional security talks. But Ambassador Ramzy Ezzeldin Ramzy, head of the Arab League group at the IAEA, made clear the text would not be withdrawn before a vote expected later on 20 September 2013. "The world has to know that Israel is not playing a constructive role, that Israel has a (nuclear) capability," Ramzy told Reuters.

US officials - who see Iran's atomic activity as the main proliferation threat - have said a nuclear arms-free zone in the Middle East could not be a reality until there was broad Arab-Israeli peace and Iran curbed its program. Israel and the US accuse Iran of covertly seeking a nuclear arms capability, something the Islamic state denies. Iran this third week of September 2013 said Israel's nuclear activities "seriously threaten regional peace and security". World powers agreed in 2010 to an Egyptian plan for an international meeting to lay the groundwork for creating a Middle East free of weapons of mass

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destruction. But the US, one of the big powers to co-sponsor the meeting, said in late 2012 it would not take place as planned last December and did not suggest a new date. Arab diplomats said they refrained from putting forward the resolution on Israel at the 2011 and 2012 IAEA meetings to boost the chances of the Middle East conference but it had no effect. "We have engaged seriously and constructively in the preparations (for the conference). The Israelis have been playing for time, delaying, we have never seen enough seriousness on their part," Ramzy said. Israel's atomic energy chief, Shaul Chorev, told this third week of September IAEA meeting that Arab states were using it as a platform for "repeatedly bashing" his country.

The Arab move only deepens "existing distrust" among the region's countries, he said.

Source: *The Jerusalem Post*, 20 September 2013.

MYANMAR

Burma Signs New Nuclear Deal With IAEA

Burma and the UN nuclear agency have signed an agreement that will give international inspectors wider access to Burmese facilities. The agreement, called an Additional Protocol, was signed on 17th September 2013 by Burmese Foreign Minister Wunna Maung Lwin and IAEA chief Yukiya Amano. The move will help clear lingering suspicions that Burma had been trying to develop nuclear weapons during the country's long military rule that ended in 2012. U Ye Htut, a spokesman for Burmese President Thein Sein, said the agreement will be very helpful.

'Although we have initially said that we don't have any plans to use nuclear energy to develop nuclear weapons, we have been under suspicion. First, by signing this Additional Protocol, it helps to clear away this doubt.

The second, this will lead the way for Burma to get opportunities, assistance in nuclear technology for use of peaceful means energy, medical research, agriculture and other research work.' David Albright, President and Founder of The ISIS,

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said the new agreement is important, but the concerns over a Burmese nuclear weapons program are small... My organization reviewed a lot of allegations about Burma's nuclear efforts and we thought most of them were not substantiated.' Burma, which joined the NPT in 1992, already is receiving IAEA assistance on matters such as accounting and control of nuclear material, and using radiation for medical and agricultural purposes.

Source: <http://www.globalsecurity.org/>, 17 September 2013.

NUCLEAR SAFETY

INDIA

India's Nuclear Reactors Most Safe In World: BARC

The country's nuclear reactors are one of the safest in the world, a senior BARC scientist said on 25th September 2013. BARC Director of Health, Safety and Environment Group and member, IAEA Dr D N Sharma said "All reactors and nuclear power plants adhere to top most safety measures and environment safety guidelines." Speaking at the 83rd national workshop on Radiochemistry and Applications of Radioisotopes (NWRAR) at Khalsa College here, he referred to the radiation accident that took place in 2012 at Mayapuri in Delhi and how safety measures had worked. "There is a plan to equip 1,000 police stations with radiation monitors in the country," he said adding, the NDMA has data on how and where an emergency can occur and how to react...

Source: <http://www.business-standard.com/>, 25 September 2013

UAE

Safety Is First At Barakah Plant, UAE Assures UN Nuclear Watchdog

The UAE vowed to set the highest possible safety standards as it outlined the progress of its nuclear power programme to the UN. The nation's permanent representative to the IAEA addressed the nuclear watchdog's annual general conference in Vienna on 18th

September 2013. Ambassador Hamad Al Kaabi said the country had learnt lessons from the Fukushima Daiichi disaster in Japan in 2011. "We welcome all efforts made by the director general [of the IAEA] in response to Fukushima and the implementation of the IAEA nuclear safety plan, which the UAE is fully committed to," Al Kaabi said. He was addressing delegates at the 57th session of the general conference of the IAEA. Al Kaabi, a board member of the Federal Authority for Nuclear Regulation, said the Fukushima disaster – the world's worst nuclear accident since Chernobyl in 1986 – had highlighted the need to strengthen nuclear safety worldwide. He emphasised that the UAE had made a commitment to leading the way on this issue and setting an example for other IAEA members.

"The UAE is an active state party in the review process of the Convention of Nuclear Safety and to the efforts aiming at strengthening its implementation," Al Kaabi said. "I take this opportunity to call on countries with nuclear facilities who have not yet done so to join and implement the convention at an early date." The Barakah power plant makes the UAE the first country among the newcomers to the nuclear sector to begin building such a facility for 27 years. The nuclear power programme is being developed to cater to the rising demand for electricity across the country. Work

The Barakah power plant makes the UAE the first country among the newcomers to the nuclear sector to begin building such a facility for 27 years. The nuclear power programme is being developed to cater to the rising demand for electricity across the country. Work on the first nuclear reactor began 2012 July and work on a second unit at the US\$20 bn nuclear plant began in May 2013. All four nuclear power plants are due to be operational by 2020.

on the first nuclear reactor began 201 July and work on a second unit at the US\$20 bn nuclear plant began in May 2013. All four nuclear power plants are due to be operational by 2020. The IAEA director general, Yukiya Amano, visited the site in January 2010 and said "safe and consistent progress" was being made on the nuclear energy programme. Al Kaabi said nuclear security was as high a priority for the UAE as any other part of the programme, and that the IAEA had a pivotal role to play in ensuring the importance of this was recognised internationally, and that training opportunities were provided. "The UAE is of the view that nuclear energy can only be pursued through a responsible and transparent approach," Al Kaabi said...

Source: <http://www.thenational.ae/>, 18 September 2013.

USA

US Nearly Detonated Atomic Bomb Over North Carolina – Secret Documents

A secret document, published in declassified form for the first time by the Guardian on 20 September 2013, reveals that the US Air Force came dramatically close to detonating an atom bomb over North Carolina that would have been 260 times more powerful than the device that devastated Hiroshima. The document, obtained by the investigative journalist Eric Schlosser under the Freedom of Information Act, gives the first conclusive evidence that the US was narrowly spared a disaster of monumental proportions when two Mark 39 hydrogen bombs were accidentally dropped over Goldsboro, North Carolina on 23 January 1961. The bombs fell to earth after a B-52 bomber broke up in mid-air, and one of the devices behaved precisely as a nuclear weapon was designed to behave in warfare: its parachute opened, its trigger mechanisms engaged, and only one low-voltage switch prevented untold carnage. Each bomb carried a payload of 4 megatons – the equivalent of 4 million tons of TNT explosive. Had the device detonated, lethal fallout could have been deposited over Washington, Baltimore, Philadelphia and as far north as New York city – putting millions of lives at risk.

Though there has been persistent speculation about how narrow the Goldsboro escape was, the US government has repeatedly publicly denied that its nuclear arsenal has ever put Americans' lives in jeopardy through safety flaws. But in the newly-published document, a senior engineer in the Sandia national laboratories responsible for the mechanical safety of nuclear weapons concludes that "one simple, dynamo-technology, low voltage switch stood between the US and a major catastrophe". Writing eight years after the accident, Parker F Jones found that the bombs that dropped over North Carolina, just three days after John F Kennedy made his inaugural address as president, were inadequate in their safety controls and that the final switch that prevented disaster could easily have been shorted by an electrical jolt, leading to a nuclear burst...

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The accident happened when a B-52 bomber got into trouble, having embarked from Seymour Johnson Air Force base in Goldsboro for a routine flight along the East Coast. As it went into a tailspin, the hydrogen bombs it was carrying became separated. One fell into a field near Faro, North Carolina, its parachute draped in the branches of a tree; the other plummeted into a meadow off

Big Daddy's Road. Jones found that of the four safety mechanisms in the Faro bomb, designed to prevent unintended detonation, three failed to operate properly. When the bomb hit the ground, a firing signal was sent to the nuclear core of the device, and it was only that final, highly vulnerable switch that averted calamity. "The MK 39 Mod 2 bomb did not possess adequate safety for the airborne alert role in the B-52," Jones concludes. The document was uncovered by Schlosser as part of his research into his new book on the nuclear arms race, Command and Control. Using freedom of information, he discovered that at least 700 "significant" accidents and incidents involving 1,250 nuclear weapons were recorded between 1950 and 1968 alone. "The US government has consistently tried to withhold information from the American people in order to prevent questions being asked about our nuclear weapons policy," he said. "We were told there was no possibility of these weapons accidentally detonating, yet here's one that very nearly did."

Source: The Guardian, 20 September 2013.

NUCLEAR WASTE MANAGEMENT

GENERAL

Study May Help Improve Geological Nuclear Waste Disposal

A team of Sandia National Laboratories researchers is looking into how fast iodine-129 released from spent nuclear fuel moves through a deep, clay-based geological repository. Understanding that process is crucial as countries worldwide consider underground clay formations for geological nuclear waste disposal, because clay offers low permeability and high radionuclide retention.

A team of Sandia National Laboratories researchers is looking into how fast iodine-129 released from spent nuclear fuel moves through a deep, clay-based geological repository. Understanding that process is crucial as countries worldwide consider underground clay formations for geological nuclear waste disposal, because clay offers low permeability and high radionuclide retention. Even when a repository isn't sited in clay,

engineered barriers often include a compacted buffer of bentonite, a common type of clay, to improve waste isolation. Iodine-129, a radioactive isotope with a half-life of 15.7 million years, is an important fission product in spent nuclear fuel and a major contributor to the predicted total radiation dose from a deep geological repository. So even a small improvement in the ability of clay to retain iodine-129 can make a difference in total dose predictions.

Some evidence indicates weak interaction between clay and iodide—a negatively charged predominant chemical species of iodine in geologic repositories, said researcher Yifeng Wang, who leads the study. Computer models haven't been able to adequately explain clay's chemical behavior with iodide, and the mechanism is difficult to study because the faint interaction is easily masked by measurement uncertainties. "It seems there's some kind of previously unrecognized mechanism that accounts for that kind of interaction," said Wang, co-principal investigator for the Laboratory Directed Research and Development project to study radionuclide-clay interaction, now in its third and final year. His team concluded the interaction, often disregarded as experimental noise, is real and that there might be engineering ways to improve clay's ability to retain iodide.

The team—Wang and former co-principal investigator Andy Miller, who recently left Sandia; technician Hernesto Tellez; and year-round interns Jessica Kruichak and Melissa Mills—developed experiments with different clays, focusing on their structural characteristics. Past studies of iodide retention in clay concentrated on bentonite. Wang's team instead studied several different clays, five with the same type of layered structure as bentonite. Although industries are accustomed to using the plentiful and oft-studied bentonite for geological nuclear waste disposal, the team's experiments show other clays have higher radionuclide retention capability and might isolate spent fuel waste better. Kaolinite had the best iodide retention of the five clays with layering properties. Wang said the team believes its work "can help us select a better clay material or combination of clay materials."

Team members believe they discovered a mechanism for iodide-clay interactions that allows more accurate

prediction of iodine-129 movement in a geologic repository. The finding was presented in May to the International High Level Radioactive Waste Management Conference in Albuquerque and was published in the conference proceedings. The experimental data indicate iodide directly interacts with the tiny spaces between the layers of clay, called clay interlayer sites. That raises the question of how negatively charged iodide gets into those negatively charged interlayer sites, since like charges repel each other, similar to magnets of the same polarity. "So that contradicts the conventional concept," Wang said.

The team got clues about what was going on by studying the problem at the nanoscale, 100,000 times smaller than the diameter of a human hair. At that scale, Wang said, the property of water changes in a way that enhances the pairing of ions.

Ion pairing explains how iodide reacts with clay and moves into the pores despite the fact both iodide and clays are negatively charged. The team postulates that iodide pairs with positively charged sodium to create a neutral ion pair. That occurs because of the enhanced ion association capability of water trapped in nanometer-scale clay inter layers, resulting in a pairing that helps iodide move into the interlayer by minimizing electric repulsion, Wang said.

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compacted when it's used as a barrier and can swell as it contacts with water. "That's why people use clay materials and compact it," Wang said. "It's a good engineered barrier to isolate radionuclides." Retention properties increase with compaction, which makes the pores smaller, he said. "That's another way to increase the effectiveness of clay materials," he said. But Sandia's study also suggests measurements in labs could be more accurate. Usually researchers break up samples before they measure the solvency of a specific material. "We actually show the nano-pore confinement makes a big difference," Wang said. "That means what you measure in the lab most of the time is not representative of an actual compacted material. The compacted material may in fact give you better retention."

Source: <http://dailyfusion.net/>, 23 September 2013.



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