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OPINION – Manpreet Sethi

**International Solidarity for Nuclear Security:
Lessons from a Pandemic**

In his September 2019 UN General Assembly speech, President Trump said, “The future does not belong to globalists...the future belongs to sovereign and individual nations who protect their citizens....” Less than six months later, the president found himself confronting a global emergency where no “sovereign and individual nation” could hope to exclusively protect its citizens, unless others did so, too. Ironically, therefore, human security is more globalised than ever before, as each state’s ability to fight COVID-19 is equally dependent other states being able to fight it just as effectively. The cover of *Time* magazine captured this reality well– “Apart, Not Alone.” Indeed, the fight against the novel Coronavirus has unambiguously highlighted the need for international solidarity.

As the battle against COVID-19 rages across the globe in as many as 185 countries, these efforts are largely being carried out at discrete national levels, with broad guidance from the WHO. None of the commonly thought of great powers—the P-5—have shown any attempt at collective leadership on the matter. Rather, at least two of them, the US and China, are caught up in mutual accusations on the virus’ origins. While the leadership in Washington has displayed

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arrogance and hyper-nationalism, in Beijing, it has resorted to non-transparency.

Owing to these sets of behaviour, international solidarity looks out of reach at this moment. But, there is an inherent limitation to handling a

pandemic at only national levels. As it stands, most states have resorted to lockdowns and social distancing as their primary tools. These strategies make every individual’s health reliant on the behaviour of the other. Any person who defies the

requirements could become a weak link and pose a risk to the safety of many. Similarly, at the international level, any state that does not effectively enforce measures to check the virus could become a weak link and fuel the crisis once

global travel normalises. The health security of an individual, and that of a state, is globalised. Laxity in rigour, carelessness of action, or hiding of information in any one state could become a global threat in no time given the highly contagious nature of this virus.

Even more scary is the prospect of use of the virus by non-state actors (NSA) for the purpose of bio-terrorism. UN Secretary General Antonio Guterres drew attention to this fact on 10 April when he issued a warning on the possibility of NSAs gaining access to virulent strains. He said, “the weakness and lack of preparedness exposed by this pandemic provide a window onto how a bio-terrorist attack might unfold.”

While the current crisis has brought a focus to the risk of bio-terrorism, the international community cannot afford to take its eyes off the challenge of nuclear and radiological terrorism either. In fact, nuclear security requires a similar level of solidarity as is being considered necessary in handling the current health emergency. All states, irrespective of whether they have nuclear holdings or not, need to understand and share the burden of collective action to ensure no leakage of nuclear and radiological material, technology, or equipment takes place.

Nuclear security, like bio-security, must be premised on the ethic of global cooperation, which is anchored in good nuclear governance. Just as the handling of this pandemic COVID requires robust national surveillance to detect, isolate, and treat, so also nuclear security. Such cooperation should ideally be facilitated by an international institution that is seen to be impartial, effective, and quick at sharing real-time intelligence and

best practices. In the case of nuclear security, the IAEA is at the centre. The IAEA would do well to learn from the current experience of the WHO. One of the most evident lesson relates to the public credibility of an international institution and how

that is linked to funding and related loyalties, as also its enforcement ability. The WHO has suffered on all these fronts—and these are areas that require attention from the perspective of nuclear security, too.

The IAEA was built largely for the purpose of implementing safeguards to check horizontal nuclear proliferation. Subsequently, nuclear safety was added to its responsibilities. It has no regular budgetary provisions for nuclear security and can offer only an advisory, recommendatory role on the matter.

These handicaps could seriously jeopardise its ability to demand and enforce national nuclear security commitments. The situation can be remedied only when addressed collectively by the wider nuclear security community. Preventing the risk of nuclear terrorism requires a

comprehensive plan—at both national and international levels. These need to be developed and implemented as a whole-of-government effort at the national level, and adopted as an all-states approach at the international level. Every stakeholder has to recognise the criticality of their role.

COVID-19 exposes our common fragility as individuals and states and how open it is to exploitation if we remain narrowly concerned with only our own security. The reality is that security in the case of bio and nuclear threats is indivisible. The security of every unit—person or state—is contingent on others’ good behaviour and

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acceptance of rules. Important lessons for nuclear security can be learnt from the ongoing efforts to address this pandemic—the most important being the need to accept our shared sense of vulnerability, and assume a shared commitment to responsibility.

Source: http://ipcs.org/comm_select.php?articleNo=5680, 27 April 2020.

OPINION – S.D. PRADHAN

Chinese Underground Nuclear Test, Proliferation Activities and Biological Warfare Capabilities

A report of Department of State of US indicates that China may have conducted a low yield underground nuclear test at its Lop Nur site. The summary of the report has been issued on the 14th April, while the detailed report would be submitted later to the US Congress. The report not only talks of a possible underground nuclear test but also of its proliferation activities and biological warfare capabilities.

It highlights ‘the use of explosive containment chambers, extensive excavation activities and lack of transparency on its nuclear testing activities’ as the factors for raising the concerns over its non-adherence to zero yield standard. Zero yield refers to a nuclear test in which there is no chain reaction of the type ignited by the detonation of a nuclear warhead. It further says that zero yield standard is adhered to by the United States, the United Kingdom, and France in their respective nuclear weapons testing moratoria.

While there is no concrete evidence for the underground nuclear test, interruptions in data transmission from China’s five sensor stations linked to a monitoring centre operated by the

international agency that verifies the compliance with a treaty banning nuclear test explosions from the beginning of 2018 to August 2019 are seen as deliberate attempts to conceal the test and other activities at the Lop Nur site. US President Trump concerned over the Chinese concealed activities pertaining to nuclear tests, had suggested that China should join the US and Russia in talks on arms control agreement to replace 2010 New Start treaty which would expire in February 2021. But that has not happened because of the Chinese reluctance to bind itself with a treaty. Significantly China is among those signatories of the CTBT, which have not ratified it.

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It highlights ‘the use of explosive containment chambers, extensive excavation activities and lack of transparency on its nuclear testing activities’ as the factors for raising the concerns over its non-adherence to zero yield standard.

China has failed to adhere to its November 2000 commitment to the United States not to assist “in any way, any country in the development of ballistic missiles that can be used to deliver nuclear weapons (i.e., missiles capable of

delivering a payload of at least 500 kilograms to a distance of at least 300 kilometers).” The report blamed the Chinese entities for continuing to supply items for missile programmes of proliferation concerns. The detention of a ship (Da Cui Yun) on the 3 rd February at the Kangla port

The detention of a ship (Da Cui Yun) on the 3 rd February at the Kangla port bearing a Hong Kong flag and bound for Port Qasim in Karachi for wrongly declaring autoclave as ‘the water purifying machine’ once again had brought the continued Sino-Pak proliferation activities.

bearing a Hong Kong flag and bound for Port Qasim in Karachi for wrongly declaring autoclave as ‘the water purifying machine’ once again had brought the continued Sino-Pak proliferation activities. Autoclave is critical for producing silica sheets

under controlled pressure for the solid fuel to be used in the ballistic missiles. Not only the item was wrongly declared but more importantly, the ship belonged to a Chinese company COSCO.

Crucially, the report also observed that China remained engaged in biological activities with

potential dual-use applications, some of which raise concerns regarding its compliance with Article I of the BWC during the period under review. This assumes considerable significance in the context of spread of coronavirus from Wuhan. It mentioned that in 2005 it was assessed that 'China maintained some elements of an offensive BW capability in violation of its BWC obligations.'

The International Community needs to take a serious view of this report. In view of close links of China with Pakistan and North Korea, there is a distinct possibility of data of test being shared with them. Turkey which has plans for nuclear weapons might also benefit from the data. There is also a need for dispassionately assessing the Chinese role and intention in concealing the important information about the coronavirus which has caused the problem world over.

Source: *The Times of India Blogs*, <https://timesofindia.indiatimes.com/blogs/ChanakyaCode/chinese-underground-nuclear-test-proliferation-activities-and-biological-warfare-capabilities/>, 17 April 2020.

OPINION – John Fairlamb

Excessive Nuclear Force Modernization should be the Next COVID-19 Victim

On March 26, a defense news outlet reported that leaders in charge of Army, Air Force and Navy budgets asked Deputy Defense Secretary David Norquist to delay a June 1 deadline to submit early budget plans for fiscal year 2022. Service leaders sought to reduce bureaucratic requirements causing large numbers of Pentagon employees to continue working, which can distract service leaders from focusing on fighting the coronavirus.

I assure you, deferring grinding bureaucratic budget work will be the least of the service chiefs' worries, given the fiscal destruction caused by the

COVID-19 pandemic and trying to keep the US economy from plunging into a depression. Whether President Trump is reelected or not, the DOD has seen the high water mark for budgets for at least the rest of this decade. Given the worrisome budget deficits we already were running, and the massive increases in deficit financing required to prop up the economy and fight the virus, defense budgets are headed for a period of sustained austerity.

In February, DOD leaders said they need 3 percent to 5 percent real growth per year to sustain the administration's buildup. They will be lucky to get flat-lined budgets. The service chiefs should start now to reconfirm their core priorities so DOD funds only absolutely necessary war-fighting capabilities and readiness, and eliminates unnecessary spending.

A key decision that the Defense Department and the chiefs will have to make is to ensure we don't overspend on nuclear weapons. A good start would be to cancel the massive buildup in nuclear weapons the administration needlessly embarked on in the 2021 DOD budget. According to the Congressional Budget Office's 2019 estimate, the Trump administration's current plan to expand and modernize our nuclear force holdings is expected to cost almost \$500 billion over 10 years. In 2018, the bill for nuclear force modernization was estimated at \$350 billion; it was later bumped to \$400 billion. And you can bet \$500 billion will end up being on the low side by the time this unnecessary expansion of our nuclear holdings is completed.

Our nuclear forces need to be modernized but we don't need as many of them as we have. The current plan to modernize all three legs of the Strategic Triad — ICBMs, SLBMs and long-range bombers — at the same numbers we currently deploy is wasteful. We should immediately reduce our deployed warheads from the 1,550 allowed under current treaty limits to 1,000 spread across

the three legs of the Triad, a level the Joint Chiefs of Staff previously certified is sufficient to meet our deterrence strategy.

We should phase the modernization, rather than do all three legs at once. Start with the submarines because they are the most reliable and survivable, but reduce the fleet by at least one and maybe two boats. Modernize the ICBMs next, but cut the number of deployed missiles from 400 to around 250. Reducing the ICBM and submarine legs of the Triad, and decreasing the number of deployed strategic warheads from 1,550 to 1,000, would save a couple hundred billion dollars.

Finally, modernize the bomber force last because the current delivery airframes can remain in service many years longer with longer-range, air-launched cruise missiles already being developed.

Another \$17 billion can be saved by eliminating the administration's plan to deploy new "tactical/lower yield" nuclear weapons. The U.S. doesn't need to deploy more so-called tactical nuclear weapons, which are inherently destabilizing because to use them invites retaliation at the strategic level. Dubious theories about controlling escalation through nuclear signaling fail the practical realism test. Once the nuclear threshold is breached, it's "Katie, bar the door."

China has maintained a "no first use nuclear policy" since acquiring nuclear weapons, and the director of the Defense Intelligence Agency recently stated that the number of warheads the Chinese have is estimated to be in the "low couple of hundreds." Ask yourself why, when confronted by massive Russian and U.S. arsenals, China maintains such smaller nuclear holdings. It's because the Chinese realize that nuclear weapons have only one role: deterring their use by potential adversaries.

Studies done at U.S. war colleges have concluded the U.S. could support its deterrence strategy at a level of only 300 to 500 deployed nuclear weapons. Classical nuclear theory instructs that deterrence works if we retain a reliable and demonstrated capability to destroy anything the opponent values, coupled with an opponent's inability to calculate how, once nuclear weapons are used, his own total destruction can be avoided. As Stanley Kubrick's "Doctor Strangelove" said, it's fear that makes deterrence work.

Source: <https://thehill.com/opinion/national-security/492498-excessive-nuclear-force-modernization-should-be-the-next-covid-19>, 16 April 2020.

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OPINION – William Tobey, Simon Saradzhyan, Nickolas Roth

Maintaining Nuclear Safety and Security During the COVID-19 Crisis

Every major industry on earth is struggling to adapt in the face of the COVID-19 pandemic. This includes nuclear facilities and nuclear-powered vessels, which count among the critical infrastructure of dozens of nations now struggling with the pandemic, representing more than half the world's population. Meanwhile, ISIS has already announced its intent to exploit the pandemic while a number of other violent extremist organizations are also taking pains to exploit the crisis. Without implementing extraordinary measures to maintain safety and security, nuclear installations risk compounding the crisis with a large-scale radiation release.

How are nuclear organizations coping with the COVID-19 crisis and what strategies seem to be among the best practices to ensure the safety and security of their operations? Responses have varied around the world, and we are still in the early days of the crisis, but already some lessons

How are nuclear organizations coping with the COVID-19 crisis and what strategies seem to be among the best practices to ensure the safety and security of their operations? Responses have varied around the world, and we are still in the early days of the crisis, but already some lessons may be inferred.

may be inferred. Moreover, nuclear power plants are only one realm of nuclear activity, which also includes fuel and waste production and disposal, as well as weapons establishments.

The possibility that a pandemic might threaten the continuity of nuclear power operations is long known. Based on his industry experience, Roger Howsley, executive director of the World Institute for Nuclear Security, observes that “[E]pidemics are usually covered in emergency planning arrangements, but probably nothing on this scale.” Indeed, the U.S. Nuclear Regulatory Commission (NRC) held a workshop on “Sustaining Safe Nuclear Operations in an Influenza Pandemic” in April 2006, which apparently prompted the Nuclear Energy Institute (NEI) to submit a draft pandemic contingency plan.

Nuclear facilities can implement protective measures as recommended by public health experts more broadly. These include: working from home; testing employees for COVID-19; use of personal protection equipment, such as masks; hand washing; distancing at work stations; temperature checks for those entering facilities; liberal sick leave; etc.

(Unfortunately, according to Edwin Lyman, “Although the NRC and NEI continued to discuss these issues more than a decade ago, there they had disagreements that were never resolved.”). Russia’s state nuclear corporation, Rosatom, also maintains that it, “always had contingency plans for any kind of emergency situations, including those related to the health of our employees.” Rosatom did not disclose details of this plan, but, judging by its recent actions, the plan could include regular health check-ups of nuclear power plant (NPP) personnel, arranging for as many employees as possible to work remotely and consistently disinfecting facilities.

All 30 countries with operational nuclear power plants and the nine states believed to have nuclear weapons (seven have both) face COVID-19 outbreaks within their territories. North Korea’s denials of COVID-19 cases appear to be about as credible as Pyongyang’s earlier denial of its nuclear weapons program. Moreover, nuclear establishments are directly affected as both civilian and military employees of these establishments, such as operators of Russian NPPs and sailors aboard the nuclear-powered USS

Theodore Roosevelt, have tested positive for COVID-19.

There are several lines of action that nuclear operators and regulators can take to mitigate safety and security risks posed by the coronavirus.

First, nuclear facilities can implement protective measures as recommended by public health experts more broadly. These include: working from home; testing employees for COVID-19; use of personal protection equipment, such as masks;

hand washing; distancing at work stations; temperature checks for those entering facilities; liberal sick leave; etc.

For example, Rosatom reports that it has deployed “protective equipment and hygiene-related products.” It also notes that it has “arranged for many

employees to work from home and purchased personal protective equipment and hygiene-related products in bulk; we are constantly disinfecting our production facilities and vehicles and have essentially cancelled all business trips.”

Duke Energy, a large U.S. nuclear power operator, reports taking steps such as, “social distancing, a no-visitor policy, increased cleaning at plants and use of screening measures before employees enter facilities. Duke has also directed employees who are not involved with power generation or other critical functions to work from home.”

At France’s EDF utility, several workers exercised their right under French law to walk off the job when facing what they deem to be unsafe conditions, because they feared that the personal radiation monitoring portals could become contaminated. In response, EDF instituted new rules regarding more frequent cleaning and wider spacing of personnel passing through the equipment. The utility also estimates that it could “operate for three months with a 25 percent reduction in staffing levels, and for two or three weeks with 40 percent fewer staff.”

U.S., U.K. and Russian nuclear regulators are reportedly working from home in greater numbers, although some also remain at regulated sites. The Savannah River Site in the U.S., which houses tons of plutonium, has limited itself to “essential mission-critical operations only,” which reduces its on-site work force from 10,000 to 2,500.

Second, nuclear enterprises can shut down or significantly reduce non-essential operations. Many have already done so. While reliable electricity production can only be interrupted in extreme circumstances, fuel cycle activities affecting nuclear materials before and after they are used in a reactor can be stopped more easily. In Canada, Cameco has suspended mining and Orono halted milling of uranium ore from Cigar Lake. Kazakhstan is preparing to make use of existing stocks to meet uranium demands. South Africa and Namibia have halted all mining, including for uranium. In the United Kingdom and France, the Sellafield and La Hague reprocessing plants are shut down. The Waste Isolation Pilot Plant in the United States reduced the amount of waste it is receiving and placing underground.

Third, nuclear sites can delay labor- and time-intensive operations. Nuclear power plants are advantaged over coal-fired operations because instead of requiring a steady stream of fuel, they generally need refueling about every two years, usually in the spring or fall, when in many Western countries electricity demand is diminished. The United States is in peak nuclear power plant refueling season. Such operations require many outside specialists to travel to and enter a plant, using transportation, hotels and restaurants for over a month, all of which are discouraged.

There are several indications that discretionary maintenance will be deferred. U.S. Nuclear

Regulatory Commission staff are reportedly considering issuing temporary waivers for some requirements, such as refueling-related inspections. EDF announced that its 2021 output would be affected by a revised outage schedule, and refueling outages in Spain are postponed. Moreover, Bruce Power in Canada has narrowed reactor life-extension tasks to focus on Cobalt-60

production (which can be used to sterilize medical equipment and is thus part of the fight against COVID-19).

Fourth, regulators can temporarily ease some regulatory controls as long as doing so does not affect safety. For example, as a provision against the contingency of a worker shortage, the U.S. Nuclear Regulatory Commission eased restrictions on the number of hours plant workers can be on the job. These deferrals must be weighed against any increased risk that they might pose to operational safety and security.

Fifth, nuclear establishments can quarantine or isolate essential workers. Enterprises in Russia, the United States, Ukraine and France are doing just that.

Ukraine’s Energoatom, which operates the country’s four NPPs, chose not to wait for any of its employees to be diagnosed with the virus. It issued an order on March 25 to house core operational personnel in separate rooms within specially appointed hotels, where all the necessary measures for disinfection and medical monitoring are being carried out.

After a technician at Russia’s Beloyarskaya NPP and his wife were diagnosed with the virus, the management followed Energoatom’s suit and re-housed key operations personnel from their apartments to a sanatorium, where they are monitored by medics based to and from the plant. Following that case, Andrei Petrov, director general

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of Rosenergoatom, the subsidiary that operates all Russian nuclear power plants, ordered on April 3 that this system be replicated at the other 10 plants, including on a floating NPP. Among other things, Petrov ordered that personnel be isolated, “which ensures the continuity of production processes and works, as well as reserve shifts,” at sanatoriums with “separate accommodation, meals, leisure and constant medical control organized for them.” The critical personnel are to be transported to and from work in designated vehicles, which are regularly disinfected, according to Petrov’s order. While the order introduced much-needed preventive measures, they did not keep three employees of the Kurskaya NPP from being infected and then diagnosed with the virus in the second week of April.

In addition to isolating key NPP personnel, Russian authorities have also restricted travel to the so-called towns where these workers normally live. Such restrictions have been introduced at the towns of Zarechny and Kurchatov, where the Beloyarskaya NPP and Kurskaya NPPs are located. At least three of the other closed towns that host Rosatom facilities have reportedly also introduced such restrictions: Novouralsk, Snezhinsk and Trekhgornyy. (Snezhinsk hosts an institute involved in the development of nuclear weapons. Novouralsk houses a uranium enrichment facility and Trekhgornyy has a nuclear warhead assembly/disassembly facility).

To further limit potential exposure, both Rosenergoatom and its parent company, Rosatom, has sent many of its non-core personnel home, asking them to work remotely. Rosatom created 3,500 remote-working jobs within days, Rosatom Director General Alexey Likhachev said in an address on April 4. While Likhachev asserted in a statement on the pandemic that “safety is Rosatom’s key value,” he did not specify, however, how Rosatom is working to

prevent the pandemic from impacting nuclear security.

As for other Russian organizations involved in ensuring and/or monitoring nuclear safety and security, the Ministry of Defense (MOD), National Guard (Rosgvardiya), Federal Security Service (FSB) and Federal Environmental, Industrial and Nuclear Supervision Service (Rostekhnadzor) have all taken measures to shield their personnel from the virus.

At the same time, however, MOD did not postpone its spring draft, which started on April 1. Moreover, none of the aforementioned agencies have released any information on whether and how many of its personnel may have been tested or diagnosed with the coronavirus. However, on

The crew of one of that fleet’s nuclear submarines was placed in quarantine in March after commanders found that some crew members had been in contact with a civilian servicing specialist who had been on a plane with an infected person, according to Russia’s RBK agency.

April 14, Russian news outlet Kommersant reported that at least three Russian military servicemen had been diagnosed with the virus by March 30. The three included a colonel in the Moscow area and a midshipman in the Northern Fleet, which operates the largest number of nuclear-powered submarines in the Russian navy, according to Kommersant. Additionally, the crew of one of that fleet’s nuclear submarines was placed in quarantine in March after commanders found that some crew members had been in contact with a civilian servicing specialist who had been on a plane with an infected person, according to Russia’s RBK agency.

In the United States, Maria Korsnick, president of the Nuclear Energy Institute, said some reactor operators are “considering measures to isolate a core group to run the plant, stockpiling ready-to-eat meals and disposable tableware, laundry supplies and personal care items.” For example, at the Diablo Canyon Power Plant, which had a pandemic response plan, separate rotating shifts have been established to ensure that if one group is infected, another one can take over. NRC’s page on the outbreak says measures taken include deferring most travel and inspections conducted by region-based inspectors; communicating with nuclear plants to discuss current activities and

future plans, including plant staffing, reactor control room operator licensing and reductions in non-essential maintenance work. Measures also include preparing to resume force-on-force security inspections in June.

In France, Orono, which has not reported a COVID-19 case among its personnel as of April 1, has as a back-up set up a group of reserve personnel that does not meet with other teams. At the same time, France's EDF is introducing stricter hygiene procedures at its nuclear power plants after the aforementioned walkout of several workers, according to Neimagazine. Additionally, all 1,700 crew members of the nuclear-powered aircraft carrier, the Charles de Gaulle, have been quarantined because of a COVID-19 outbreak on-board.

Sixth, like other elements of critical infrastructure, nuclear enterprises are ramping up their cyber defenses to meet an increased threat. According to one nuclear security manager, "Hackers and criminals are unscrupulous and would take advantage of the relatively fragile situation of companies." Martin Smith of the Security Awareness Special Interest Group, a forum for frontline security professionals in various industries, reports that, "Many of our members have highlighted the massive increase in phishing attacks and online scams that have bubble[d] up since [the COVID-19 crisis] started." These problems are compounded by remote work policies that may compromise cyber-security measures.

Seventh, nuclear operators can share what they are learning about how to cope with the impacts of COVID-19. While some nuclear facilities have plans in place in case of a pandemic, the length of

this international crisis may strain any existing plans. Information sharing can be a critical tool to

help operators cope with current challenges and the challenges ahead. According to Peter Tarren, head of the IAEA Operational Safety Section, "The IAEA is gathering feedback from operating countries about how they are ensuring that enough personnel are available to keep power plants operating safely and

securely." The IAEA has several reporting systems in place for helping nuclear facilities share information about safety-related events: the International Reporting System for Operating Experience, the Fuel Incident Notification and Analysis System and the Incident Reporting System for Research Reactors. The IAEA has also established a "COVID-19 Operational Experience Network" to support sharing of information on how the virus is impacting power plant performance and what mitigation measures are being taken. If they do not already, these systems should include lessons learned about how nuclear facilities are maintaining their security operations.

We likely won't know the full impact of COVID-19 on nuclear safety and security for a long time, if ever. In Russia and the United States, there is

anecdotal evidence that personnel within organizations responsible for nuclear safety and security have been impacted. In the United States, employees at Y-12 and Pantex, the locations with the most weapons-usable nuclear material in the United States, have tested positive. In Russia,

as detailed above, the crew of a Northern Fleet nuclear submarine was reportedly quarantined after coming in contact with someone who'd flown with an infected person, according to Russia's RBK

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agency. It was not until the crew tested negative for the virus twice that the submariners were allowed to leave quarantine.

In the face of this global crisis, nuclear enterprises worldwide are taking active steps to ensure that they can maintain safety and security. Many had planned against the possibility of an epidemic, but very likely the scale and severity of the current crisis are beyond what was imagined. As plants defer refueling, power output will be diminished, although demand has, too. Many plants can operate for weeks with a diminished workforce, but longer strictures will likely force closures. Some steps that have been taken are clearly sensible, but it is too early to tell how well nuclear safety and security systems are holding up under the stress of the COVID-19 crisis.

It can be said, however, that the following steps taken by some of the national operators of nuclear facilities in individual countries should be replicated to increase chances that the aforementioned systems withstand the stress of the crisis. For instance, we think it would be feasible to replicate Rosenergoatom's, Energoatom's and other NPP operators' steps to isolate core NPP personnel. We also think that these steps should be replicated by civilian and military agencies that operate other types of reactors, such as research reactors and power units of surface vessels and submarines. We also believe that the units and civilian organizations that operate all types of nuclear reactors, be it electricity generators or research reactors or propulsion units, should also draw contingency plans, if they have not already done so, for scenarios in which the number of healthy operational personnel falls below levels that allow for safe operations.

Many plants can operate for weeks with a diminished workforce, but longer strictures will likely force closures. Some steps that have been taken are clearly sensible, but it is too early to tell how well nuclear safety and security systems are holding up under the stress of the COVID-19 crisis.

In contrast to ISIS, al-Qaeda has so far refrained from urging its followers to seize on turmoil created by the pandemic to stage attacks, but it did seek to highlight flaws in the Western governments' response to the crisis and to urge citizens of these countries to convert to Islam.

We also believe that the agencies responsible for ensuring nuclear security should have contingency plans to make sure that units involved in ensuring adequate levels of nuclear security remain adequately staffed to foil any attacks by non-state actors, such as the Islamic State, that may want to exploit the disruptions caused by the virus to try to stage catastrophic attacks. In fact, as early as in mid-March ISIS reportedly began urging its followers to exploit disruptions caused by the virus in various countries to stage attacks.

A month later four suspected members of an Islamic State cell were arrested in Germany. The four Tajik nationals, whom German law-enforcement took into custody on April 15, are accused of plotting to attack U.S. military bases in the country—one of which has nuclear weapons. In contrast to ISIS, al-Qaeda has so far refrained from urging its followers to seize on turmoil created by the pandemic to stage attacks, but it did seek to highlight flaws in the Western governments' response to the crisis and to urge citizens of these countries to convert to Islam. Some Western white supremacist organizations have also not hesitated to exploit the crisis. In March, the FBI told police agencies in New York that white supremacists intended to spray Jews and police officers with virus-infected bodily fluids, while New Jersey's Office of Homeland Security and Preparedness warned that a neo-Nazi media group had encouraged supporters "to incite panic while people are practicing social isolation during the COVID-19 outbreak, which includes discharging firearms in cities and putting bullet-sized holes into car windows," according to a report in The Washington Post.

As detailed above, the nuclear establishments of

countries across the world are acting to maintain safety and security while providing power to vital operations during the COVID-19 crisis. Many had planned against the possibility of an epidemic, but very likely the severity of the current crisis is beyond what was imagined. Some of the steps that they have been taken and that we describe are sensible, but more can and should be done: nuclear enterprises need to share information, learn quickly and adapt over the course of the crisis.

Source: <https://www.russiamatters.org/analysis/maintaining-nuclear-safety-and-security-during-covid-19-crisis>, 16 April 2020.

OPINION – Pulkit Mohan

New Delhi is Banking on Nuclear, but will it Succeed?

A boost to India's status in the global nuclear dialogue came as a result of the strategic dialogue between India and the United States, and the fact that India presently has civil nuclear agreements with 14 countries, has been instrumental in India's rise. Even so, India continues to hold an interesting position in the global nuclear order as it is neither a signatory to the NPT, nor is it a member of the NSG. This relative isolation is just one of a number of factors that pose barriers to India's rapid rise in the global nuclear order.

For New Delhi to truly establish its role in the sector, it is crucial to actively pursue civil nuclear engagement with new actors as well as to strengthen existing relationships. Deeper engagement with allies such as the US and France would help encourage more countries to enter in civil nuclear partnerships with India.

Climate and Clean Energy Offer Avenues for Engagement: India's energy deficit and the success of the country's climate action policies are important factors to consider in the push for

greater commitment to the nuclear energy sector and international alliance building. Given India's ever-growing energy demand, the pressure is on New Delhi to strike a balance between economic growth and adhering to the requirements of the Paris Agreement.

At present, India's primary energy source is coal, but the country's coal reserves are rapidly declining. These two factors make coal use unsustainable in the long run, necessitating a shift towards more reliable and long-term energy supplies. At the same time, nuclear energy contributes merely 2% to India's total energy requirements. As of March 2020, India has 22 operable reactors, with 7 more under construction.

The opportunities to expand this sector through international agreements are therefore abundant. Indeed, while NPPs require large investments in

the set-up, the longer-term payoff is important to account for, especially when India's energy deficit and need to implement successful climate action policies are considered.

An Uneven Road to Global Acceptance: Reaching out, however, is not easy for

India due to its complex position in the global nuclear order. Several barriers need to be overcome to do so successfully, both on the international and domestic level. Resulting from its relative isolation, Indian nuclear technology has been a result of indigenous development and subsequent in-house improvement, but even so, nuclear sector growth has been traditionally stunted. However, the 2005 India-U.S. civil nuclear agreement and the 2008 NSG waiver have been instrumental in facilitating India's entry into the field as a potential stakeholder and key supplier.

A number of India's agreements – notably with the United States, Russia, France and Japan – include the exchange of expertise, technologies and personnel. Russia continues to be a key supplier of nuclear fuel to India, and helped construct more reactor units at the Kudankulam

For New Delhi to truly establish its role in the sector, it is crucial to actively pursue civil nuclear engagement with new actors as well as to strengthen existing relationships. Deeper engagement with allies such as the US and France would help encourage more countries to enter in civil nuclear partnerships with India.

site. In 2019, the two countries also announced the intention to set up over 20 Russian-designed nuclear reactors in India over the next two decades. France and Japan also have been key in development of expertise and have boosted India's interaction with key global players.

Since India had to rely on indigenously developed technology, its nuclear technology base has been somewhat dated. A shortage of fuel for reactors to operate at optimal capacity slowed India's rise in the global nuclear order as well. Although cooperation with Russia, Japan and France has boosted civil nuclear abilities, it is important to expand India's cooperation in order to set up more technologically advanced foreign-built units and increase supply for fuel from key supplier countries.

Given the implications of this cooperation, it's a shame that Indian policymakers have been slacking in building ties with the international community. Although India has made immense strides in establishing itself as a responsible nuclear power through a self-moratorium and a distinct separation of its civil and military nuclear endeavours, it is important for policymakers to work towards overcoming concerns of key actors in its security practices. Accession to the IAEA safeguards agreement was a step in the right direction, but to stifle security concerns, much more proactive engagement with the global nuclear security culture is indispensable.

Lacklustre Engagement: Not Just an International Issue: A similar issue applies to the domestic level, where the nuclear energy sector is controlled by the state-owned NPCIL. Although the

government allowed private enterprises to provide nuclear power, the engagement between NPCIL and the private sector has been scant.

It is of paramount importance that policymakers delve deeper into engagements with key stakeholders in the civil nuclear energy sector. A better relationship and deeper engagement between the public and the private sector in nuclear energy would substantially and expeditiously improve India's capacity to produce nuclear power, as well as develop and improve upon the country's indigenous personnel and expertise.

Clearly, this is a domestic policy debate with implications for international actors as well. Particularly nuclear liability has posed a direct challenge to India's engagement with the global nuclear order, because India's domestic laws put the responsibility of liability of the suppliers – international norms put the onus on operators. Although India has dealt with liability issues on a case-to-case basis, there is apprehension amongst interactional players to deepen cooperation as long as the international standard is not adopted.

Coming in from the Cold:

Although India's presence in the global nuclear order has been fairly small, its accomplishments in the face of the limiting factors mentioned above should be acknowledged. However, policymakers are nonetheless plagued with a number of issues in

advancing India's position as a key and responsible actor – issues that need to be quickly overcome in the face of growing energy demand and pressing sustainability goals.

Source: <https://www.sustainability-times.com/low-carbon-energy/new-delhi-is-banking-on-nuclear-but-will-it-succeed/>, 28 April 2020.

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NUCLEAR STRATEGY

CHINA

'China Conducted Nuclear Tests' a US Trick to Push West-led Treaty: Chinese Expert

The Chinese Foreign Ministry rubbished the US' accusation that China may have secretly conducted nuclear tests, and a Chinese nuclear disarmament expert said the groundless accusation is a US attempt to push China into a Western countries-led nuclear treaty while also diverting domestic pressures caused by the novel coronavirus.

The Chinese statements came after the US State Department released the Executive Summary of 2020 Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments, which claimed that China may have secretly conducted low-level nuclear test blasts at the Lop Nur nuclear weapons test site throughout 2019. The report did not provide evidence for what it claimed to be "zero yield" nuclear test blasts, Reuters reported.

The US' accusation is completely groundless, fictitious and not even worth refuting, Foreign Ministry spokesperson Zhao Lijian said at a regular press conference. Zhao said that China had been among the first countries to sign the CTBT, and China always supported the aim and purpose of the treaty, kept its promise of suspending nuclear tests, and made important contributions to the work of the treaty's Preparatory Commission. Zhao noted that the technical secretariat of the Preparatory Commission had given full affirmation to the data transmission work of observation stations in China.

The US side ignored facts and made groundless speculation, and its accusation against China is irresponsible and reflects ulterior motives, Zhao said. Citing the US State Department report, the *Wall Street Journal* claimed that China had used

special chambers to contain explosions, and that data transmissions from monitoring stations that were designed to detect radioactive emissions and seismic tremors recorded interruptions in past years, and a satellite photo taken on March 29 of Lop Nur showed cement truck activity.

... No special chamber could completely seal off a nuclear test blast, and radioactive materials are bound to leak to some extent and cause local earthquakes, Yang said, noting that China did not undertake any "coverups" of observation data, and the data transmission interruption could have been caused by system upgrades. The US should reflect on itself in terms of arms control and in the nonproliferation field, as it had prioritized its own interests by quitting multiple related treaties and going against the trend of the times, Zhao said.

"Quitting the Intermediate-Range Nuclear Forces Treaty and the Joint Comprehensive Plan of Action with Iran, withdrawing from the signing of the Arms Trade Treaty, obstructing negotiations for a protocol with a verification regime of the Biological Weapons Convention, having still not disposed of all stockpiles of chemical weapons, enhancing military power in all aspects...the US has seriously sabotaged the global strategic balance and stability, hindered international arms control and disarmament, and drawn general condemnation from the international community. It has no right to see itself as a referee or judge," Zhao said.

Yang said that the US has been trying to tie China down in a Western countries-led nuclear arms control arrangement, but China should not participate because the US possesses far more nuclear weapons than China, and the US has never stopped developing nuclear weapons.

By asking China to join the arrangement and seeing China refuse to do so, the US is also hoping to gain a public opinion advantage for itself to further make tactical, low-yield nuclear weapons, which the US has already developed and deployed on its

By asking China to join the arrangement and seeing China refuse to do so, the US is also hoping to gain a public opinion advantage for itself to further make tactical, low-yield nuclear weapons, which the US has already developed and deployed on its missiles.

missiles, Yang said. Hying groundless speculation about China conducting nuclear tests could also be an attempt to shift domestic focus, as the US is under huge pressure from the COVID-19 epidemic with more than 630,000 Americans infected, Yang said.

Source: Fan Lingzhi and Liu Xuanzun, Global Times, <https://www.globaltimes.cn/content/1185857.shtml>, 16 April 2020.

USA–RUSSIA

Pompeo Tells Russia's Lavrov Any New Arms Control Talks Must Include China

U.S. Secretary of State Mike Pompeo told his Russian counterpart that any future arms control talks must focus on an American proposal for a new arms control accord that includes Russia and China, the State Department said. Pompeo emphasized in a telephone call with Russian Foreign Minister Sergey Lavrov that “any future arms control talks must be based on President Trump’s vision for a trilateral arms control agreement that includes both Russia and China,” State Department spokeswoman Morgan Ortagus said in a statement.

China, whose arsenal of an estimated 300 nuclear weapons is far smaller than those of Russia and the United States, has rejected such talks. Ortagus said Pompeo’s comments came as he and Lavrov discussed “next steps in the bilateral Strategic Security Dialogue, taking into account the COVID-19 pandemic”.

Trump last year proposed that the United States, Russia and China negotiate a new pact to replace the 2010 New START accord that cut deployed U.S. and Russian nuclear warheads and the bombers and land- and submarine-based missiles that carry them to their lowest levels in decades.

New START will expire next February unless the sides agree to extend it for up to five years. Russia has said it would be willing to extend the accord, but the Trump administration has declined to state a position. The Russian foreign ministry said Lavrov had “reiterated the Russian proposal to extend the START treaty, due to expire in February 2021”, in his conversation with Pompeo. “(On the call) it was underlined that Russia is ready to work on possible new nuclear weapons agreements, but that it would be important to preserve... the START treaty while preparations are ongoing,” the ministry said in a statement.

U.S. administration officials argue that China must be brought into any new arms control pact because of the growing threat is posed by its nuclear arsenal, which is undergoing a modernization program. Arms control experts, however, have

China must be brought into any new arms control pact because of the growing threat is posed by its nuclear arsenal, which is undergoing a modernization program. Arms control experts, however, have described Trump's proposal to include China in a new treaty as a “poison pill” strategy to kill New START and end restraints on U.S. nuclear arms deployments.

described Trump’s proposal to include China in a new treaty as a “poison pill” strategy to kill New START and end restraints on U.S. nuclear arms deployments. Ortagus said Pompeo also discussed with Lavrov bilateral issues, “including the detention of U.S. citizens”. She did not elaborate on the number or identity of Americans detained in Russia.

Source : <https://www.reuters.com>, 17 April 2020.

Russia Open for Talks with US on Hypersonic Weapons

Moscow is open for a dialogue with Washington on new advanced developments, including hypersonic weapons, Russian Foreign Minister Sergey Lavrov said in an online interview with Russian and foreign media. “We are also open for a talk on new advanced developments, including hypersonic weapons, in the context, and I want to emphasize it, of all the aspects and all the factors that influence strategic stability,” Lavrov said.

This talk should cover the plans of deploying weapons in outer space, strategic conventional

armaments, the future of the CTBT and other issues, the Russian foreign minister explained. Moscow is ready to discuss cooperation with Washington in the peaceful use of outer space, Sergey Lavrov stated.

... Responding to a question about what Moscow was seeking from the Russia-US working group on outer space, Lavrov pointed out that the group was the result of a long-lived dialogue. "You know, it is not that we are seeking something, this is simply the result of our dialogue with the United States that has been going on for quite a long time regarding which mechanisms and to solve which world problems both Moscow and Washington consider the most essential, as well as on which of these issues Russian-American interaction can be maximally fruitful," the Russian foreign minister explained.

Outer space and all that is linked with it is one of such issues where Russia and the United States hold leading positions, "which was recently confirmed during a talk of President [of Russia Vladimir] Putin with the Russian-US crew of the International Space Station" and during telephone talks of the presidents of both countries, in particular, during that on Cosmonautics Day, April 12, Lavrov pointed out.

Russia's top diplomat announced the intention to hold phone talks with US Secretary of State Mike Pompeo. ... He noted that Russia and the US intend to resume work on the strategic stability as a whole more substantively, which, according to him, will be possible after the coronavirus pandemic is over. "Right now, we all work remotely. There are things, including some strategic stability points that could be discussed via a video or phone conference painlessly. And then there are issues that should better be postponed until the global situation allows us to resume direct diplomatic contact," Lavrov commented.

The Russian minister also highlighted the latest round of consultations between deputy heads of diplomatic agencies in mid-January in Vienna —

the Russian delegation was led by the Deputy Foreign Minister Sergei Ryabkov, while the American one was led by Assistant Secretary of State for International Security and Non-Proliferation Christopher Ford. "However, we want more specific discussions particularly on the arms reduction treaty and its future fate," Lavrov pointed out.

Source: <https://tass.com>, 14 April 2020.

BALLISTIC MISSILE DEFENCE

INDIA

Pakistan Criticizes Proposed Sale of US Missile Systems to India

Pakistan said that a proposed new multimillion-dollar sale of American missile systems to Islamabad's archrival, India, would destabilize an already "volatile" situation in South Asia./ The U.S. Department of State cleared the delivery of 10 AGM-84L Harpoon Block II air-launched missiles, 16 MK 54 lightweight torpedoes and related equipment to India. New Delhi has not commented on the \$155 million deal, which is still subject to congressional approval.

This talk should cover the plans of deploying weapons in outer space, strategic conventional armaments, the future of the CTBT and other issues, the Russian foreign minister explained. Moscow is ready to discuss cooperation with Washington in the peaceful use of outer space.

"Pakistan has articulated its concerns regarding the sale of sophisticated weapons to India, which would further destabilize the region," Foreign Ministry spokesperson Aisha Farooqui told her weekly news conference./ The deal is "particularly disturbing" at the time when global efforts are focused on fighting the COVID-19 pandemic, Farooqui said, while responding to a question from VOA. "There is a high possibility of India conducting a false flag operation while global efforts are directed towards combating the pandemic."

... U.S. defends proposed sale: Washington, however, says, "The proposed sale of this equipment and support will not alter the basic military balance in the region." It said the weapon systems will be integrated into the Indian Navy's

Boeing P-8I advanced maritime patrol and anti-submarine warfare aircraft to improve India's capability to meet current and future threats from enemy weapon systems.

"This proposed sale will support the foreign policy and national security of the United States by helping to strengthen the U.S.-Indian strategic relationship and to improve the security of a major defensive partner, which continues to be an important force for political stability, peace, and economic progress in the Indo-Pacific and South Asia region," a U.S. statement said./

Source: <https://www.voanews.com/>, 17 April 2020.

IRAN

'Significant Concern': UK Condemns Iran Ballistic Missile Launch

The United Kingdom said that an Iranian satellite launch earlier was of significant concern and inconsistent with a UNSC resolution. "Reports that Iran has carried out a satellite launch - using ballistic missile technology - are of significant concern and inconsistent with UN Security Council Resolution 2231," a Foreign Office spokesman said.

"The UN has called upon Iran not to undertake any activity related to ballistic missiles designed to be capable of delivering nuclear weapons. Iran must abide by this. "We have significant and long-standing concerns, alongside our international partners, over Iran's ballistic missile programme, which is destabilising for the region and poses a threat to regional security."

Iran's Islamic Revolutionary Guard Corps (IRGC) surprised analysts by sending its first military satellite into space from a previously unused launchpad and with a new system. While Iran stresses that its programme is peaceful, Western nations fear it will help the country build intercontinental ballistic missiles. State television said Iran received signals from the satellite, without elaborating.

...A government statement said: "Given that the technology used for space launches is very similar to that used for ballistic missile launches, this launch directly contributes to the extremely troubling progress made by Iran in its ballistic missile programme." Russian Foreign Ministry spokeswoman Maria Zakharova meanwhile rejected assertions that the launch violated the UN Security Council's resolution on Iran, noting that Iran has the right to develop its space program for peaceful purposes.

Iranian General Amir Ali Hajizadeh, head of the IRGC's aerospace division, told state television that ground stations in Iran are communicating with the satellite, which takes about a week to reach its full capacity. He said, without elaborating, that the IRGC plans to send more such satellites into even higher orbits in the future.

Source: Kate Mayberry and Saba Aziz, [https://www.aljazeera.com/news/2020/04/concern-uk-condemns-](https://www.aljazeera.com/news/2020/04/concern-uk-condemns-iran-ballistic-missile-launch-200424110411558.html)

[iran-ballistic-missile-launch-200424110411558.html](https://www.aljazeera.com/news/2020/04/concern-uk-condemns-iran-ballistic-missile-launch-200424110411558.html), 29 Apr 2020.

PAKISTAN

Pakistan Navy Conducts Successful Anti-ship Ballistic Missile Test

In a statement, the Spokesperson of Pakistan Navy said that the Chief of Naval Staff Admiral Zafar Mahmood Abbasi witnessed the missile firing. The Spokesperson said that Pakistan Navy's warships and aircrafts fired surface-to-surface anti-ship missiles.

The Spokesperson said that the successful conduct of missile test is an evident of the Pakistan Navy's operational capabilities and war preparedness. The Naval Chief Admiral Zafar Mahmood Abbasi expressed satisfaction over the Navy's operational readiness, and said that the force has the capability to give a befitting reply to the enemy's aggression. ...

Source: <https://www.livemint.com/>, 25 April 2020.

NUCLEAR ENERGY

CHINA

China Says Virus Outbreak will not Impact Nuclear Power Plant Construction

The coronavirus outbreak will have no impact on the progress of nuclear power plant construction in China in the short term, and reactors already in operation have not been affected, a nuclear safety official said. All 15 unfinished reactor units had resumed construction and no plants now in operation were suspended during the outbreak, Tang Bo, director of the nuclear safety inspection department at the Ministry of Ecology and Environment (MEE), told reporters.

China originally aimed to bring total nuclear capacity up to 58 GW by the end of this year, and have another 30 GW under construction, but it is not expected to meet the targets due to prior project delays and a halt in new approvals. China was initially expected to approve at least six new nuclear projects this year. It had a total of 47 plants in operation by the end of last year, with total capacity at 48.75 GW.

At the same briefing, Jiang Guang, director of the MEE's radiation safety department, said China was actively looking for new sites to build nuclear waste treatment plants, and it would also expand the capacity of its three existing facilities. China had the capacity to treat 76,800 cubic metres of nuclear waste a year, with around 45,000 cu m being utilised, but needed to build more facilities to cope with the new reactor coming on line, he added. Authorities had also chosen nine potential sites for an underground high-radiation waste

The coronavirus outbreak will have no impact on the progress of nuclear power plant construction in China in the short term, and reactors already in operation have not been affected, a nuclear safety official said. All 15 unfinished reactor units had resumed construction and no plants now in operation were suspended during the outbreak.

Work slated to be carried out during maintenance outages had been "significantly affected," it said, which had in turn lowered output capacity. "Furthermore, the economic slow-down has brought about a drop in electricity consumption, which could potentially fall by 20% compared to usual levels, thereby resulting in reduced nuclear output.

treatment programme.

Source: <https://www.reuters.com/article/us-china-energy-nuclear/china-says-virus-outbreak-will-not-impact-nuclear-power-plant-construction-idUSKCN21XOB4>, 14 April 2020.

FRANCE

As the Coronavirus Pandemic Bites, EDF Lowers its Nuclear Output Projections for 2020

In the latest example of how the Covid-19 pandemic is impacting the energy sector, French utility EDF said that it was sharply revising down its projected nuclear output for this year. In a statement, the company said it expected its nuclear output for 2020 to be "in the region of" 300 TWh —

a steep downwards revision to the 375-390 TWh previously forecast.

The company explained that in response to the ongoing public-health crisis it had made adjustments to all of its activities in order to protect workers at its nuclear power plants. Work slated to be carried out during maintenance outages had been "significantly affected," it said, which had in turn lowered output capacity.

"Furthermore, the economic slow-down has brought about a drop in electricity consumption, which could potentially fall by 20% compared to usual

levels, thereby resulting in reduced nuclear output," EDF said.

According to data from Johns Hopkins University, France has reported 134,598 cases of Covid-19, and 17,188 people have died. Looking ahead, EDF added that it was working with French grid operator RTE to provide a "continuous supply of

power” this winter, and said that a number of reactors “may have to be taken off line this coming summer and autumn in order to save fuel on these power plants.”

Given the above, the firm said output was expected to be between 330 to 360 TWh in 2021 and 2022. Shares of EDF were down around 5%. Earlier, the company withdrew all of its financial targets for 2020 and 2021. Globally, EDF operates 73 nuclear reactors, with 58 of these located in France.

As a country, France is still heavily reliant on nuclear power. In 2018, its nuclear power production rose 3.7% to 393.2 TWh — accounting for more than 70% of the country’s total energy generation — according to figures from RTE. ‘Clean energy’ job losses: It’s not just France that is facing challenges as a result of Covid-19 — the energy sector globally is too. In the U.S., for instance, experts claimed that over 100,000 people working in the U.S. “clean energy” sector lost their jobs in March, as the industry — which covers renewables and energy storage among others — battled with the impact of the coronavirus pandemic. ...

Source: <https://www.cnn.com/2020/04/16/as-coronavirus-bites-edf-lowers-nuclear-output-projections-for-2020.html>, 16 April 2020.

USA

China Firmly Opposes Politicization of Nuclear Energy Cooperation by US

The United States set out a strategy for reviving the nation’s nuclear industry that recommends granting US energy regulators the power to block imports of nuclear fuel from Russia and China. China firmly opposes the politicization of nuclear energy cooperation by the United States, Foreign Ministry representative Geng Shuang said in the wake of a US nuclear energy strategy paper published.

The report stated that the United States should push Russia and China out of their nuclear technology markets and become a world leader in this area. ...Russia and China cannot adhere to high standards of non-proliferation of nuclear weapons in their nuclear energy cooperation like the United States and, in fact, lower them using it as a tool for marketing goods. This is absolutely untrue”, the representative stated.

He stressed that in recent years, Washington has made attempts, under various pretexts, to tarnish and put pressure on the nuclear energy cooperation of individual countries, and some US officials have even stated that they intend to use such cooperation as a geopolitical instrument, the diplomat added. “Beijing strongly opposes such erroneous politicization of nuclear energy cooperation and refuses to accept the fictitious accusations against China mentioned in this report”, he emphasized.

The new US energy strategy, which has been submitted to President Donald Trump for consideration, says that the US should become a global leader in the nuclear technology market, superseding Russia and China. It adds that it is necessary to prevent China and Russia from having solid relations with Eastern Europe and Africa.

Source: <https://nation.com.pk/24-Apr-2020/china-firmly-opposes-politicization-of-nuclear-energy-cooperation-by-us>, 24 April 2020.

The United States should push Russia and China out of their nuclear technology markets and become a world leader in this area. ...Russia and China cannot adhere to high standards of non-proliferation of nuclear weapons in their nuclear energy cooperation like the United States and, in fact, lower them using it as a tool for marketing goods.

NUCLEAR COOPERATION

IAEA-UK

IAEA, UK’s National Lab Strengthen Cooperation

Activities in which cooperation may be pursued include: increasing the efficiency of operating nuclear power plants; good practices in stakeholder involvement; good practices in

innovation for existing and future nuclear power reactor designs; advanced nuclear technologies, including small modular reactors and innovative nuclear energy systems; and, decommissioning and radioactive waste management and disposal.

Dohee Hahn, director of the IAEA Division of Nuclear Power, said the agreement "recognises and strengthens our longstanding collaboration that continues to serve the interests of our Member States, in particular those currently relying on nuclear power or that foresee a role for nuclear power in sustainable energy systems of the future. I appreciate the tangible outcomes already delivered through this partnership; for example, NNL experts contributed to the planning and implementation of the IAEA 2019 International Conference on Climate Change and the Role of Nuclear Power. I look forward to the results still to come."

NNL Chief Strategy Officer James Murphy added, "NNL already has long history of successful collaboration with the IAEA. To give just two examples, we were pleased recently both to mark 40 years of successful input from the UK (much of it led by NNL) to the IAEA's Safeguards Assistance programme and to have NNL's Preston Laboratory accredited as a member of the prestigious IAEA Network of Analytical Laboratories. It's great to see this successful relationship being broadened and strengthened in this way, and this in turn represents an exciting opportunity for NNL and IAEA to work together to jointly tackle some of the greatest challenges facing all aspects of our sector. Only through important collaborations of this kind, will we ensure nuclear can continue to play its vital role in the global low carbon economy." ...

Source: <https://world-nuclear-news.org/Articles/IAEA-NNL-agree-to-strengthen-cooperation>, 14 April 2020.

RUSSIA–TURKEY

Putin, Erdogan Discuss Nuclear Energy Cooperation

Russian President Vladimir Putin has held a telephone conversation with Turkish leader Recep Tayyip Erdogan, the Kremlin press service said in a statement. "The parties discussed pressing issues related to Russian-Turkish cooperation, focusing on trade and economic ties, including nuclear energy projects and plans to boost agricultural and transport cooperation," the statement reads. ...

Much of the international nuclear establishment has moved away from Cesium-137 because of the dangers associated with this radiological source, especially its potential theft and use by terrorists. But India's nuclear establishment has bucked the trend and is instead deepening its dependence on Cesium-137. However, India's choice is not as surprising as might seem at first glance: there are very good reasons for it.

Source: <https://tass.com/politics/1147843>, 21 April 2020.

NUCLEAR SAFETY

INDIA

Nuclear Safety: Why India Relies on Cesium-137

Much of the international nuclear establishment has moved away from Cesium-137 because of the dangers associated with this radiological source, especially its potential theft and use by terrorists. But India's nuclear establishment has bucked the trend and is instead deepening its dependence on Cesium-137. However, India's choice is not as surprising as might seem at first glance: there are very good reasons for it.

First, some context. There has been a global effort to find an alternate technology to highly radiological sources in an effort to strengthen security of radiological materials. Nuclear and radiological materials falling into terrorist hands or those of criminal gangs has remained a serious concern especially since the 9/11 terrorist attacks on the United States. The US Energy Policy Act of 2005 created an Interagency Task Force on Radiation Source Protection and Security to undertake this task. The Task Force has produced

four reports, containing its evaluation and recommendations to the President and Congress, on the level and type of threats that emanates from potential terrorists. The Task Force has looked at a range of threats including theft, sabotage, or use of a radioactive source in an RDD or RED. The last report of the Task Force came out in October 2018.

In the aftermath of the Mayapuri incident, there have been concerted efforts within India to move away from the use of Cobalt-60 to explore other options. One such source that India has been exploring is Cesium-137.

The report of the Task Force in 2014 and 2018 has reported that though “the viability of alternative technologies for some applications has improved significantly, there are still limitations to the widespread implementation of most applications.” The US Department of Homeland Security in a September 2019 report stated that there are “significantly increased concerns related to the security of sealed sources and their potential use in a RDD, which disperses radioactive material over a large area, or a radiation exposure device (RED), which could be hidden in a public area to expose people to radiation.” Since concerns meant that there have been consistent efforts within the US and around the world to find alternatives for some or all the functions in sectors that are currently using radiation sources. This is a challenge faced by a number of countries including India. The limitations in the case of India include economic feasibility and availability of alternative technologies.

In 2015, BARC scientists concluded that Cesium-137 can be recovered from the nuclear waste discarded by the atomic power plants and that this can be used to meet the demands in the medical and industrial sectors.

Not all radiological sources are the same in terms of their potency and risks. The riskier ones include Cobalt-60, Cesium-137, Iridium-192, Strontium-90, Americium-241, Californium-258, Plutonium-238, and Radium-226. The radiation effects are not the same even among these high-risk sources. There are several factors including type of exposure, and the kind of radiation emitted, whether it is alpha, beta or gamma. In India, the AERB, India’s nuclear regulator, is responsible for the complete inventory of all radiation sources used within the country. Some of the more frequently used sources within India are Cesium-

137, Cobalt-60, Tritium (H-3), Sodium-24, Bromine-82, Anthranium-140, Iodine-131, Molybdenum-99, Scandium-46, and Krypton-79. These have been used in several sectors including medicine, agriculture and industry.

India has by and large ensured secure practices while handling radioactive sources but it had an incident with one of the high-risk radiological sources in 2010. In early 2010, the disposal of a gamma unit using Cobalt-60 by the University of Delhi without following the recommended procedures led to the unit landing up in the hands of a scrap dealer in West Delhi. The incident resulted in the death of one person and seven persons suffered from radiation injuries. The AERB during interviews conducted by the author stated that they have made the rules and regulations more stringent in the wake of the Mayapuri incident. The AERB is also reported to have worked with the higher education body in India, the UGC, in tightening the procedures while handling radiological sources. After the Mayapuri episode, the AERB has apparently conducted several awareness camps in an effort to educate scrap dealers and other locals in broad terms about radiological security.

In the aftermath of the Mayapuri incident, there have been concerted efforts within India to move away from the use of Cobalt-60 to explore other options. One such source that India has been exploring is Cesium-137. Cesium-137 has been used in the medical sector as well as for well-logging purposes in the oil and gas sector. India’s Cesium-137 is “being recovered from the high level waste arising from reprocessing spent fuel from thermal reactors.” Though the global community is shifting from Cesium-137 to other sources and technologies, India is replacing Cobalt-60 with Cesium-137 because India’s nuclear establishment sees it as a viable option. In 2015, BARC scientists concluded that Cesium-137 can be recovered from the nuclear waste

discarded by the atomic power plants and that this can be used to meet the demands in the medical and industrial sectors. Following this determination, Dr. Sekhar Basu, the chairman of the Atomic Energy Commission, said, "This technology is being used for the first time in the world in commercial domain." C.P. Kaushik, an engineer at the BARC too endorsed the idea saying, "The new Caesium based irradiator is more economical and requires lesser handling so it is safer.

The Indian atomic energy establishment has preferred Cesium-137 as an appropriate alternative because its half-life is longer (30 years) than that of Cobalt-60 (5.27 years). Short half-life generally would mean transportation, loading and unloading, and handling the source on multiple occasions, increasing the overall security risks. Nevertheless, acknowledging the security risks posed by Cesium-137, especially in its traditional powder form, the Indian nuclear establishment has set up a separate facility to develop vitrified Cesium-137 pencils which are used for blood irradiation. Indian nuclear scientists agree with their global counterparts about the danger of Cesium-137 because in powder form, it is "highly soluble in water and the powder can get easily dispersed resulting in release of activity during accidental conditions." But, they argue that they have resolved the danger to a large extent by using it in vitrified pencil form.

It may appear surprising that India is moving from Cobalt-60 to Cesium-137 at the same time that the global community is moving away from Cesium-137 to other safer materials. [In fact, the author has been repeatedly asked about the Indian rationale for using Cesium-137 at many nuclear security forums.] So, India should expect the global nuclear community to continue to focus on India's surprising preference for Cesium-137 despite the dangers associated with it. The Indian nuclear establishment can also be expected to

reiterate its view: that the risks associated with Cesium-137 when used in vitrified pencil form are lesser; that since it is harvesting its Cesium-137 from nuclear waste, it is reducing the overall nuclear security dangers; and that the longer half-life of Cesium-137 actually makes it safer.

Source: Rajeswari Pillai Rajagopalan, <https://www.orfonline.org/expert-speak/nuclear-safety-why-india-relies-cesium-137-64881/>, 20 April 2020.

NUCLEAR PROLIFERATION

IRAN

Trump Administration Doubles Down on Iran Nuclear Treaty Allegations

The Donald Trump administration is using the State Department's annual arms control compliance report to build upon its previous allegations that Iran may be violating the 1970 Treaty on the NPT. The State Department submitted a brief executive summary of the report to Congress. This year's executive summary bolsters the emphasis that last year's report placed on the trove of documents that Israel says it obtained in a 2018 raid on an Iranian nuclear archive.

The 2019 report asserted that the archive itself "could potentially constitute a violation" of the NPT's ban on nuclear weapons development. The summary of this year's report goes a step further by noting that the IAEA reported "articles of chemically processed uranium at an undeclared location in Iran." "Iran's intentional failure to declare nuclear material subject to IAEA safeguards would constitute a clear violation of Iran's [comprehensive safeguards assessment] required by the NPT and would constitute a violation of Article III of the NPT itself," the executive summary says.

Notably, compliance reports under both the Trump and Barack Obama administrations had

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consistently found that issues related to Iranian NPT violations “were resolved as of the 2015 reporting period, despite Iran’s continued refusal to acknowledge or provide certain information about the military dimensions of its past nuclear activities.”

That assessment changed last year under the leadership of Yleem Poblete, a prominent Iran hawk who served as assistant secretary of state for arms control, verification and compliance. Poblete left the post in June after clashing with Undersecretary of State for Arms Control Andrea Thompson over the 2019 report. Thompson left her post in October.

The assistant secretary of state post remains vacant, but the 2020 report indicates that the State Department is still determined to move forward with its case over Iran’s alleged NPT violations. “The problem with inserting all these concerns rather than sticking to hard and fast assessments of legal compliance ... is that you’re taking this away from being a very cut-and-dry document for the purpose of seeing where we are with treaty compliance and turning it into more of a political document,” said Alexandra Bell, a senior policy director at the Center for Arms Control and Non-Proliferation who worked on the compliance reports as a senior adviser to the State Department under President Obama. Still, Iran’s reduced cooperation with the IAEA in recent months is providing fodder for the Trump administration’s arguments.

The summary of the 2020 report notes that Tehran has refused to provide IAEA inspectors with “access at two locations not declared by Iran and did not substantively respond to the IAEA’s

requests for clarification regarding possible undeclared nuclear material or activities at those locations and a third, unspecified location.”

Iran agreed to allow IAEA inspectors to monitor its NPT compliance as part of Obama’s 2015 nuclear deal. But after Trump’s 2018 withdrawal from the deal, Iran began violating its end of the bargain, nearly tripling its enriched uranium stockpile since November. Iran also said it would no longer obey the deal’s restrictions following Trump’s January strike on Iranian Maj. Gen. Qasem Soleimani — even as Tehran continues to negotiate with Europe.

While the Iran nuclear archive and the IAEA’s struggle to inspect potential undeclared nuclear sites have already been widely reported, the full report — which is undergoing a declassification review — may contain more specifics. This marks the second year in a row that the Trump administration has missed its April deadline to submit the full report to Congress. “They were actually legally required to get the full assessment up,” said Bell.

“It would be nice to see that sooner rather than later.”

Source: <https://www.al-monitor.com/pulse/originals/2020/04/trump-double-down-iran-nuclear-treaty-allegations.html#ixzz6Jrj8n1Eh>, 16 April 2016.

PAKISTAN

US Signals Growing Unease with Pakistan, Tightens Export of Nuclear Byproducts

The United States has suspended the export of nuclear byproducts under a blanket general licensing system to Pakistan, whose history of nuclear proliferation has been a concern and has

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led to the blacklisting of many of its government agencies and private contractors. The decision announced in the government gazette called the Federal Register does not prohibit export of these nuclear materials — that are used as radionuclides embedded in devices — altogether, but make it mandatory for exporters to seek government's permission every time and for every specific consignment.

Radionuclides are radioactive elements used widely, among other fields, in medicine and for irradiation of food. "The US NRC is issuing an Order suspending the general license authority under NRC regulations for exports of byproduct material to Pakistan," said the announcement in the register. "Exporters are no longer authorized to use the general license to export byproduct material to Pakistan and now must apply for a specific license pursuant to NRC regulations." It did not ascribe any specific reason other than that the Trump administration has determined that the suspension is "necessary to enhance the common defense and security of the United States and is consistent with the provisions of the Atomic Energy Act".

The order did not say so, but under relevant rules, a country's proliferation record can be ground for cancellation of export license. "The Commission will closely monitor these countries and may at any time remove a country from a general license in response to significant adverse developments in the country involved," says the code of federal regulations for the energy sector. "A key factor in this regard is the nonproliferation credentials of the importing country."

A response was awaited from the US NRC to a request for the reasons for the suspension. ... The Trump administration has continued to pursue Pakistani government agencies, private contractors and fronts, who have sought to find a

way around US rules and conditions, with unmitigated urgency and unchanged priority. The immediate trigger could not be ascertained. ...

The US justice department indicted five Pakistani and Pakistani-descent men in January for using front companies to procure American goods for Advanced Engineering Research Organization and the Pakistan Atomic Energy Commission, both Pakistani government agencies that are on the US "Entity List" of exporting destinations whose activities have been declared "contrary to US national security or foreign policy interests". ...

While most commodities are getting hammered by the coronavirus crisis, uranium prices are skyrocketing. The radioactive metal used in nuclear fuel has climbed 31% this year, making it the world's best-performing major commodity. The gains have been spurred by mine shutdowns that have wiped out more than a third of annual global output at a time when demand from power plants has remained relatively stable.

Source: <https://www.hindustantimes.com/world-news/us-signals-growing-unease-with-pakistan-tightens-export-of-nuclear-byproducts/story-TUqwuYUWCGJJ6kRSgN5ftJ.html>, 24 April 2020.

URANIUM MINING

GENERAL

Uranium Surges 31% Amid Shutdowns to become Year's Top Commodity

While most commodities are getting hammered by the coronavirus crisis, uranium prices are skyrocketing. The radioactive metal used in nuclear fuel has climbed 31% this year, making it the world's best-performing major commodity. The gains have been spurred by mine shutdowns that have wiped out more than a third of annual global output at a time when demand from power plants has remained relatively stable.

... While demand for energy, including nuclear, is taking a hit due to the pandemic, many atomic power plants are expected to keep open. That's partly because coal- and gas-powered plants are easier to turn on and off than nuclear facilities, so it's worth keeping them running even if electricity demand declines somewhat, Piquard said.

... In response to low prices, two industry giants, Kazatomprom and Cameco Corp., have been curtailing uranium production in the past three years to reduce the global glut. The Covid-19 crisis has accelerated that process with a jolt. Kazatomprom, the largest uranium producer, announced earlier in April it was reducing operational activities at its uranium mines in Kazakhstan for about three months.

Meanwhile, Cameco further decreased its own output in March by halting production at Cigar Lake in Canada, the world's largest producing mine — then extended the suspension for an “indeterminate” period on April 13. The company also shut some operations at its Port Hope fuel-service facility for four weeks. All told, the shutdowns wiped out about 46 million pounds, or about 35%, of annual global uranium output, over three weeks, according to Cantor Fitzgerald analyst Mike Kozak.

As in other countries, U.S. reactors are considered essential infrastructure, and utilities are implementing resilience plans to ensure they remain in operation to keep the power flowing. The Nuclear Regulatory Commission issued guidance in March for utilities to request longer shifts for workers if needed, and is also letting companies defer some inspections.

... Uranium futures traded on the New York Mercantile Exchange have soared about 36% since mid-March to \$32.50 a pound. Equities and exchange-traded funds have followed the rally. Among the gainers, Cameco, Uranium Participation Corp., North Shore Global Uranium Mining ETF and Horizons Global Uranium Index ETF have all risen at least 50% from their March lows.

The increases may be sustainable. The current scenario has the potential to become “the turning point in a 10-year bear market,” Scotiabank analyst

Orest Wowkodaw said in an April 13 note. Fueling the uranium rally is fear of securing future supply. Utilities typically hold 1.5 to 5 years of inventory as a hedge against logistical hiccups to keep power flowing. More recently nuclear utilities, the biggest customers, have been able to top off their needs through excess inventories built up around the world.

The Waste Isolation Pilot Plant's permit is set to expire in 2024, but federal officials who oversee the nation's nuclear programs believe the underground repository near Carlsbad can keep taking radioactive waste for decades to come. Critics contend WIPP, where the waste is buried in salt beds 2,150 feet underground, should not operate beyond the 25-year life that was planned when it opened in 1999.

But with several supply and price shocks hitting the market all at once and inventories already low, uranium customers such as utilities may “scramble to secure material,” said Cantor's Kozak. Spread of the pandemic has slowed ships, trucks and planes that shuttle commodities to consumers from their suppliers. ...

Source : Aoyon Ashraf and Joe Deaux, <https://www.bloomberg.com/news/articles/2020-04-17/top-commodity-performer-uranium-gains-even-with-energy-use-weak>, 17 April 2020.

NUCLEAR WASTE MANAGEMENT

USA

Federal Agencies Want to Extend Nuclear Waste Site to 2080

The more than 20-year-old nuclear waste disposal site in Southern New Mexico would remain active for at least 60 more years under a proposed permit renewal, reflecting the role of nuclear weapons in the country's Cold War past and what many federal leaders envision for the future.

The Waste Isolation Pilot Plant's permit is set to expire in 2024, but federal officials who oversee the nation's nuclear programs believe the underground repository near Carlsbad can keep taking radioactive waste for decades to come. Critics contend WIPP, where the waste is buried in salt beds 2,150 feet underground, should not operate beyond the 25-year life that was planned when it opened in 1999.

They also argue WIPP is fast approaching its limit, and alternative disposal sites should be created outside New Mexico. "It's been clear to everybody that WIPP had a limited amount of waste it could handle," said Don Hancock, director of nuclear waste safety for the nonprofit Southwest Research and Information Center. Yet federal agencies submitted a proposal calling for a permit renewal until 2080, Hancock said. And the latest proposal gives no date for when the permit extension would end, he said. "So it's WIPP forever," he said.

WIPP has the word "pilot" in its name, which means it was supposed to be the first nuclear waste disposal site, not the only one, Hancock said. Officials at the National Nuclear Security Administration, which oversees WIPP, did not provide answers to questions about the site's permitting, storage capacity and long-term future.

WIPP receives radioactive material from sources as varied as the decommissioned Hanford Site in Washington state and Los Alamos National Laboratory. The Los Alamos lab's legacy waste generated during the Cold War and Manhattan Project is sent to WIPP. If the lab and Savannah River Site in South Carolina ramp up nuclear-core production as planned by 2030, the new waste will go to WIPP.

The Department of Energy also wants to use WIPP as one of the sites to store 34 megatons of diluted plutonium waste. It's unclear how much of the waste would go to WIPP. The plan poses challenges, such as how to efficiently dilute the plutonium and how much storage space WIPP would have for the material, the National Academy of Sciences said in a 2018 report.

The 1992 Land Withdrawal Act limits WIPP to 6.2 million cubic feet of waste, or about 175,000 cubic meters. It also restricts the storage to transuranic waste — from elements that have atomic numbers

higher than uranium in the periodic table, primarily produced from recycling spent fuel or using plutonium to fabricate nuclear weapons. Taking in discarded plutonium would require Congress to amend the law, Hancock said.

Under the state's hazardous waste permit for WIPP, the volume of material stored there is calculated according to the outer waste containers. Using that measure, the site is close to 60 percent full. But the Energy Department persuaded the state Environment Department in 2018 to change the calculation so the empty headspace in the containers isn't counted.

At the Hanford Site in south-central Washington state, 177 giant tanks sit below the sandy soil, brimming with the radioactive remnants of 44 years of nuclear-materials production. From World War II through the Cold War, Hanford churned out plutonium for more than 60,000 nuclear weapons, including the atomic bomb that razed Nagasaki, Japan, in August 1945.

...The Energy Department, in turn, estimated WIPP had only used about 40 percent of its capacity. Hancock's group and two other watchdogs filed a legal challenge, contending the methodology was invalid. They argued the original calculations based on container size should be used. They also hoped Democratic Gov. Michelle

Lujan Grisham's administration would reverse the permit revision. But the administration has taken no action. ...

Source : Scott Wyland, https://www.santafenewmexican.com/news/local_news/federal-agencies-want-to-extend-nuclear-waste-site-to-2080/article_acff4dbc-8573-11ea-93ac-2bea172dcd37.html, 25 April 2020.

A Glass Nightmare: Cleaning Up the Cold War's Nuclear Legacy at Hanford

It's a place of superlatives. Reporters have called it the most polluted place in the Western Hemisphere. It's also the location of one of the largest construction projects in the world.

At the Hanford Site in south-central Washington state, 177 giant tanks sit below the sandy soil, brimming with the radioactive remnants of 44 years of nuclear-materials production. From World War II through the Cold War, Hanford churned out

plutonium for more than 60,000 nuclear weapons, including the atomic bomb that razed Nagasaki, Japan, in August 1945. The sprawling enterprise eventually contaminated the soil and groundwater and left behind 212 million liters of toxic waste—enough to fill 85 Olympic-size swimming pools. Decades after the site stopped producing plutonium, the U.S. government is still grappling with how to clean it all up.

Today the 1,500-square-kilometer site, roughly half the size of Rhode Island, is a quiet expanse of sagebrush and wispy grasses outside Richland, Wash. The underground steel-and-reinforced-concrete tanks are grouped in “farms” beneath a central plateau, while shuttered nuclear reactors stand like sentinels on the periphery. Scientists have identified some 1,800 contaminants inside the tanks, including plutonium, uranium, cesium, aluminum, iodine, and mercury. Watery liquids rest atop goop as thick as peanut butter and salt cakes resembling wet beach sand.

The waste is what’s left of an intense period in wartime and Cold War innovation. Starting in 1943, Hanford experts pioneered industrial-scale methods for chemically separating plutonium from irradiated uranium, and doing so safely. Their original bismuth-phosphate process yielded hockey-puck-size “buttons” of plutonium, which were then formed into spherical cores and used in the 1945 Trinity atomic bomb test in New Mexico and then the Nagasaki bomb. Over the years, five more processes followed, culminating with PUREX, which became the global standard for processing nuclear fuels.

Each of these methods produced its own distinct waste streams, which were stored on-site and then pumped into underground storage tanks. When some of the older single-shell tanks started leaking years later, workers pumped the liquids into newer, sturdier double-shell tanks. Chemical

reactions ensued as the different waste products mixed together, leaving each tank filled with its own complex aggregation of liquids, solids, and sludges.

The upshot is that by 1987, when Hanford stopped producing plutonium, the tank farms contained a deadly brew of chemicals, metals, and long-lasting radionuclides. No two of the 177 tanks contain exactly the same concoction, but they all pose a significant public risk. The site borders the Columbia River, which nourishes the region’s potato crops and vineyards, serves as a breeding ground for salmon, and provides drinking water for millions of people. So far, the aging, corroding vessels have leaked roughly 4 million liters. Some

experts have said it’s only a matter of time before more waste seeps through the cracks.

The U.S. DOE, which controls Hanford, has for decades had a goal of treating and “vitrifying,” or glassifying, the tank waste for safer disposal.

...Vitrification plants have been built and successfully operated in Belgium,

France, Germany, Japan, Russia, the United Kingdom, and the United States. But Hanford’s waste is unique among the world’s nuclear leftovers, in both composition and volume. Before they can turn it into glass, workers must first figure out exactly what is inside each tank and then develop glassmaking formulas for each batch.

It is a monumental task, and it’s just one facet of one of the biggest engineering projects in the world. The centerpiece of the work is a series of vast facilities called the Waste Treatment and Immobilization Plant, also known as the Hanford Vit Plant, sprawled over some 25 hectares. The DOE currently estimates that it will cost US \$16.8 billion to finish the plant, which is being built by Bechtel National and a host of subcontractors. Even as scientists continue to puzzle over Hanford’s tank waste, and as contractors flip the lights on in shiny new buildings, concerns about

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massive cost overruns, contractor lapses, and missed deadlines weigh heavily on the project. Hanford, born and built feverishly in the heat of World War II, now seems to be in a slow, meandering slog toward an unseen finish line....

Source : Excerpted from article by Maria Gallucci. <https://spectrum.ieee.org/aerospace/military/a-glass-nightmare-cleaning-up-the-cold-wars-nuclear-legacy-at-hanford>, 28 April 2020.



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