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The nuclearisation of the Russian Arctic: new reactors, new risks

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Introduction

While the world focuses on managing the consequences of novel coronavirus, other global risks warrant political attention. As the sea ice retreats and the permafrost collapses due to climate change, the growing nuclearisation of the Russian Arctic should be high on this list.

The largest concentration of nuclear installations – both civilian and military – is in Northern Russia. During the Cold War, the Soviet Union kept a significant portion of its nuclear-weapons arsenal in the Arctic, carried out extensive nuclear weapons testing at Novaya Zemlya, and used its waters as nuclear dump sites.[1] Russia's inability to effectively deal with this nuclear legacy created the potential for an environmental catastrophe and became a major post-Cold War challenge.[2] During the period 1996-2006, defence agencies of the United States and Norway – later joined by the United Kingdom – worked with Russia to jointly manage transboundary radioactive waste issues under the aegis of the Arctic Military Environmental Cooperation (AMEC) program.[3]

Today, almost three decades after the international cleanup started, a new generation of nuclear reactors are coming to the Arctic. In 2019, *The Independent Barents Observer* reported that there are 39 nuclear-powered vessels or installations in the Russian Arctic, with a total of 62 reactors.[4] This is set to increase considerably over the next 15 years. According to some estimates, the Russian Arctic will constitute the most nuclearised waters on the planet by 2035.[5]

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Russia's poor record on nuclear management, coupled with insufficient emergency preparedness capabilities in the Arctic, raises safety concerns. These include potential incidents involving nuclear contamination, which could severely harm the Arctic marine environment and population alike, and pose a serious threat to Russia, Europe, and potentially the United States. We should not wait to put in place early warning and transparency mechanisms that reduce the risks of a dangerous nuclear incident in the Arctic.

‘Nuclearisation’ of Russian Arctic in recent years

In 2018, the Russian government assigned the management of the Northern Sea Route (NSR) to state-owned nuclear corporation Rosatom.[6] With Rosatom in charge, there has been a greater prioritisation of using nuclear power for shipping, infrastructure development, and the extraction of natural resources in the Russian Arctic.[7]

Russia’s first **floating nuclear power plant**, the Akademik Lomonosov, was deployed in 2019 in Pevek to provide clean energy to people and businesses across the Chukotka region.[8] Rosatom sees this as a pilot project and hopes to deploy a fleet of such units in Russia, and to export this technology abroad.[9]

Only five **nuclear-powered icebreakers** exist in the world and they all belong to Rosatom.[10] By 2035, Russia’s Arctic fleet is expected to operate at least 13 heavy-duty icebreakers, nine of which will be nuclear powered.[11] In addition to crashing the ice to enable passage along the NSR, the nuclear-powered ‘50 Years of Victory’ also serves as a North Pole expedition cruise for high paying travellers.[12] Three such voyages were initially planned for the summer of 2020 but were cancelled.

Russia is also increasing the number of **nuclear-powered submarines**. The Northern Fleet’s submarine force currently consists of 32 vessels.[13] By 2027, ten Borei-class (or fourth-generation ballistic missile) submarines will be built and commissioned, half of which will serve in the Northern Fleet. In addition, five Yasen-class submarines will be deployed with the Northern Fleet.[14]

Not only are the *numbers* increasing but the *levels* of submarine activity are also growing. As Thomas Nilsen of the Barents Observer points out, “tensions between Russia and NATO have led to more sailings with reactor-powered submarines, especially in the Norwegian, Barents- and White Seas, but also under the ice in the high Arctic.”[15] Given the growing submarine activity, the more tensions rise, the more likely submarine accidents will be.

Moreover, Russia continues to use the Arctic as a **testing site**, most recently for its new nuclear-powered cruise-missile and underwater drones.[16] This Autumn, the Arctic waters will be used to test-launch the nuclear-powered Poseidon underwater device – dubbed the ‘doomsday drone’.[17]

In addition to increasing the number of reactors, by 2030 the Russian government intends to lift several pieces of **radioactive debris** from the seabed, including the K-159 and the K-27 nuclear submarines, for decommissioning and long-term storage.[18] Although the cleanup is hailed as an important first step to reduce risks from potential radioactive contamination of the marine environment, Ingar Amundsen of the Norwegian Radiation and Nuclear Safety Authority warned that an accident during a lifting operation could release more radiation into the environment.[19] Conducting a risk assessment is important for Russia to minimize these risks.

From the Chernobyl disaster in 1986 to the Kursk submarine sinking in 2000, Russia's nuclear safety record leaves much to be desired. Last year alone, two deadly nuclear power accidents occurred in the Russian Arctic.

Russia's past and present nuclear practices

Russia has demonstrated that it has the technical know-how for operating in Arctic conditions. However, its poor record for nuclear safety coupled with the increasing number of reactors in the Russian Arctic has raised alarm among other Arctic states and environmental groups.

From the Chernobyl disaster in 1986 to the Kursk submarine sinking in 2000, Russia's nuclear safety record leaves much to be desired. Last year alone, two deadly nuclear power accidents occurred in the Russian Arctic. In July 2019, a fire broke out on the special-purpose nuclear-powered submarine Losharik, killing 14 sailors.[20] One month later an explosion offshore of the Nyonoksa missile site left five Russian nuclear scientists dead and three injured. The explosion is believed to have been linked to the failed Skyfall missile test.[21]

In these instances and in other cases, Russia withheld critical incident information about the severity and extent of radioactive contamination in an attempt to evade accountability.[22] Although Russia had signed a joint notification agreement on reporting nuclear accidents with Norway, it did not provide an immediate alert to the Norwegian Radiation and Nuclear Safety Authority about a nuclear incident in the Barents Sea when the Losharik incident occurred.[23] The official Russian news agency TASS reported the accident the following day without specifying that the submarine was nuclear-powered.[24]

Another issue concerns the provision of radiation data. Soon after the Skyfall explosion in August last year, Russian radiation monitoring stations nearest to Nyonoksa went offline. When questioned, Russia argued that the transmission of data from its radiation stations to the nuclear test ban monitoring organisation, the Comprehensive Test Ban Treaty Organisation (CTBTO), was voluntary and that the incident was not a matter for the CTBTO.[25] This fueled suspicion that the radiation could have been heavier than what was officially reported.

What keeps us up at night

There is a long list of potential incidents that involve the possible release of radioactive material in the Russian Arctic. Four are highlighted here. At the top of the list is the safety of the **nuclear floating station**, the Akademik Lomonosov. Although Rosatom insists the plant is 'virtually unsinkable',[26] environmentalists fear that it could be tossed by waves in storms, become steerless if the mooring breaks, or hit an iceberg and sink, causing substantial contamination.[27] Rising storm intensity, fueled by warming oceans, heightens some of these risks. Concerns have also been raised about the lack of regulatory oversight of the plant's construction, testing, fueling and its transport from the home port to Pevek.[28]

Yet the riskiest operations take place within the city limits of Murmansk. When not operating in ice-covered waters, icebreakers are docked in the Rosatomflot's **service base in Murmansk**, where all fresh and spent nuclear fuel is transported to and from.[29] Service ships storing spent nuclear fuel from the fleet of nuclear icebreakers are also berthed there.[30] "An accident which releases radioactivity could reach densely populated areas in Murmansk long before anyone manages to trigger the emergency evacuation alarm," warns Thomas Nilsen.[31]

The third risk is linked to a **potential nuclear shipping incident**. Expanding LNG exports from the Yamal Peninsula have been accompanied by a large increase in nuclear-powered icebreaker escorts.[32] In 2019, nuclear-powered icebreakers accompanied a total of 510 vessels, an increase of 54 percent compared to 2018.[33] With global warming, regular commercial shipping in the Arctic will increase the likelihood of accidents triggered by extreme weather and climate events, such as stronger winds, storms, and higher waves. One plausible incident scenario involves a collision of a foreign-owned

LNG tanker and Russian nuclear-powered icebreaker escort in a winter storm, with a serious potential for release of radioactive contaminants.[34] The recent oil spill in Norilsk, caused by the erosion of the surrounding permafrost, illustrates the considerable risks that increasing economic activity can have on the regional environment, as well as the catastrophic effect climate change is having in the Arctic.[35] Ecological issues can, in turn, accelerate disease spread and have detrimental effects on human health.

Moreover, given the increased levels of submarine activity in the Barents Sea – by both Russia and NATO member states – **a serious incident or accident involving nuclear-powered submarines or military vessels carrying nuclear weapons** is practically unavoidable. One only needs to recall the 2009 collision of French and British submarines in the Atlantic, which raised questions about the safety of ballistic missile submarines patrolling the oceans while hiding their position.[36] While a submarine accident in the deep ocean arguably carries fewer risks – owing to the massive dilution of radioactivity – a submarine collision in the shallow waters of the Barents Sea is an unknown scenario with potentially disastrous consequences.

The presence of radiological and nuclear material poses a serious threat to the Arctic marine environment and industries, including fisheries and local food sources.[37] Fishing is one of the most important industries in the Arctic, representing large shares of gross domestic product (GDP) in some countries (e.g. 8,1% in Iceland).[38] In the case of Norway, a big share of exports come from the Arctic in the form of seafood. Any rumour of leaking spent fuel – let alone an actual nuclear incident – could be devastating to the country's market and seafood sales.[39] These and other concerns have prompted Norway and other Arctic states to cooperate with Russia in the field of nuclear and radiation safety.

The above-mentioned risks are further compounded by the fact that the Arctic currently lacks multiple facets of both operational and research infrastructure that is needed to provide key elements of both short and long-term response to a major nuclear release incident.[40]

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Recommendations

Russia's historically lax safety practices, combined with its growing Arctic ambitions, could lead to dangerous outcomes. Nuclear accident risks in an increasingly ice-free yet treacherous Arctic are real. One need only look at the Fukushima disaster in Japan, accompanied by extraordinary lack of government transparency, to understand the risks of placing sizable nuclear reactors in the proximity of water.

During the Cold War, when US/NATO and Soviet/Russian nuclear forces were on high alert for possible nuclear attacks, and tensions between the two sides were as high as they are today, transparency and confidence-building measures (TCBMs) helped reduce risk of miscalculation, escalation of a crisis, and enabled a modicum of necessary early warning information to be shared among the parties.[41] Think of the red 'hotline' phone that used to adorn the desks of Presidents Reagan and Brezhnev.[42] Today, in an era where we again face low levels of trust, disinformation, and poor communication among the key actors in the region, new types of TCBMs could be useful.

There are a number of measures that can help mitigate both civilian and military dangers involving nuclear reactors:

Today, in an era where we again face low levels of trust, disinformation, and poor communication among the key actors in the region, new types of transparency and confidence-building measures could be useful.

1. First, the Arctic states, as well as the International Atomic Energy Agency (IAEA), have a responsibility to anticipate and adequately prepare for intersecting climate and nuclear risks.[43] Due to a lack of modelling and analysis capability, awareness of the potential hazards in Arctic waters has not been sufficient to catalyse better global governance to prepare for and prevent those risks. Capabilities for measuring and predicting changing Arctic ocean currents and atmospheric circulation patterns are extremely limited at present which severely impedes situational awareness and incident response

decisions.[44] Therefore, connecting environmental and safety agencies with technology communities and conducting much-needed research could help improve surveillance, data collection, radiation detection, and the overall understanding of where wind and water currents could potentially carry contaminants in the event of a major radioactive release.

2. Second, existing agreements need to be strengthened or supplemented. Russia is party to the IAEA Convention on Early Notification of a Nuclear Accident, which applies to nuclear accidents that result in "international transboundary release" of radioactive material that could be of "radiological safety significance" for another state.[45] Any accident that meets those conditions *must* be reported – be it civilian or military. Russia is also a signatory to the IAEA Convention on Nuclear Safety, which addresses the safety of land-based nuclear reactors.[46] While the Convention excludes military and marine power reactors, its applicability to transportable and floating nuclear power plants needs to be clarified.[47]

3. Third, there is a need for strategic engagement with Russia to minimise nuclear risks in the Arctic. The establishment of a dedicated expert group on nuclear emergencies within the Arctic Council in December last year constitutes a step in the right direction.[48] The group brings together experts from all eight Arctic states in order to advance emergency prevention, preparedness and response capabilities among the Arctic states in the event of radiological and nuclear incidents.[49]

Creating a military Code of Conduct for the Arctic, and including Russia, is the best way forward.

4. Fourth, to address the risks of unintended *military* incidents involving nuclear weapons, it is important to define what is deemed tolerable and acceptable military practice in the region and what is not. Creating a military Code of Conduct for the Arctic, and including Russia, is the best way forward.[50] In addition, a separate TCBM agreement involving all Arctic states could be negotiated. Such an agreement could build on the principles embodied in the Open Skies Treaty, the Vienna Document 2011, the Incidents at Sea (INCSEA) Agreement, the Agreement on Prevention of Dangerous Military

Activities (DMA), and other CBM agreements that are intended to reduce the risks of conflict arising from failure of communication, misunderstanding, and lack of mutual transparency.[51] The agreement could eventually open to all states that conduct shipping and air operations in the Arctic.

5. Fifth, in addition to information and knowledge sharing, it is important for Arctic states to identify preparedness and response arrangements and capabilities that are needed in the Arctic. Coordination and joint planning for response to nuclear emergencies is essential, much like the work of the Arctic Coast Guard Forum (ACGF) to plan for oil spills, search and rescue, and non-nuclear shipping incidents. A legally binding Arctic Council cooperation agreement on radiation emergencies – modelled on existing agreements on oil pollution and search and rescue – could open the door for multinational exercises, better exchange of information, and plans for coordinated response in the event of maritime radiological and nuclear accidents.[52]

Each of these measures would build confidence among the Arctic and other nations that nuclear shipping and operating risks will be identified and limited to the extent possible.

Blurring the line between civilian and military reactors will prove especially problematic with regard to civilian oversight and bonafide safety or risk analysis.

Russia is increasing its Arctic nuclear capabilities with little regard to managing the potential dangers. The matter is further complicated by the dual-use nature of capabilities and technologies that are being deployed in the region.[53] Blurring the line between civilian and military reactors will prove especially problematic with regard to civilian oversight and bonafide safety or risk analysis. The expression that "no plan survives contact with reality" does not mean that good planning is not worth the effort. Given the growing risks of nuclear incidents in the Russian Arctic, efforts should be redoubled to develop confidence-building measures to limit them.

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