

Chatham House Report

Patricia Lewis, Heather Williams, Benoît Pelopidas
and Sasan Aghlani

Too Close for Comfort

Cases of Near Nuclear Use and Options for Policy



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April 2014

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Executive Summary

Nuclear weapons have not been detonated in violent conflict since 1945. The decades since then are commonly perceived – particularly in those countries that possess nuclear weapons – as an era of successful nuclear non-use and a vindication of the framework of nuclear deterrence. In this narrative, the fear of massive retaliation and a shared understanding and set of behaviours are believed to have prevented the use of nuclear weapons. Yet the decades since 1945 have been punctuated by a series of disturbing close calls. Evidence from many declassified documents, testimonies and interviews suggests that the world has, indeed, been lucky, given the number of instances in which nuclear weapons were nearly used inadvertently as a result of miscalculation or error.

A shared belief in nuclear deterrence is not the only plausible explanation for this avoidance of nuclear war. Rather, individual decision-making, often in disobedience of protocol and political guidance, has on several occasions saved the day. Whereas the popularized image of the ‘Moscow–Washington hotline’ gives the illusion that vital communication in times of crisis is possible, these incidents reveal the reality that those who possess nuclear weapons will continue to be distrustful of one another and remain reliant on data transmitted by systems that are vulnerable to error or misjudgment, particularly when leaders have to respond too quickly to be able to make fully informed decisions.

Historical cases of near nuclear use resulting from misunderstanding demonstrate the importance of the ‘human judgment factor’ in nuclear decision-making. In addition to cases from the Cold War, recent incidents, such as the 2009 collision of French and UK submarines, along with cases of misconduct in the US Air Force revealed in

2013, suggest cause for concern regarding current laxity in safety and security measures and in command and control. Incidents similar to those that have happened in the past are likely to happen in the future. A study of cases of near nuclear use can thus address a number of important questions. What chain of events led to these incidents, and what prevented nuclear weapons from being used? How might past instances improve assessment of contemporary risks? When and how have measures taken in order to prevent inadvertent use failed? What additional measures can be taken now?

In answering these questions, this study applies a risk lens, based on factoring probability and consequence, applied to a set of cases of near nuclear use spanning the Cold War to the 21st century. The primary finding of the study is that, since the probability of inadvertent nuclear use is not zero and is higher than had been widely considered, and because the consequences of detonation are so serious, the risk associated with nuclear weapons is high. We offer explanations for why these risks are higher than previously thought and recommendations for mitigating them.

For as long as nuclear weapons exist, the risk of an inadvertent, accidental or deliberate detonation remains. Until their elimination, vigilance and prudent decision-making in nuclear policies are therefore of the utmost priority. Responses that policy-makers and the military should consider include buying time for decision-making, particularly in crises; developing trust and confidence-building measures; refraining from large-scale military exercises during times of heightened tension; involving a wider set of decision-makers in times of crisis; and improving awareness and training on the effects of nuclear weapons.

Incidents of near nuclear use

Date	Incident	States involved	Cause
October 1962	Operation Anadyr	Soviet Union	Miscommunication
27 October 1962	British nuclear forces during the Cuban missile crisis	United Kingdom	Conflict escalation
27 October 1962	Black Saturday	United States	Conflict escalation and miscommunication
22 November 1962	Penkovsky false warning	Soviet Union	Espionage
October 1973	1973 Arab–Israeli war	Israel	Conflict escalation
9 November 1979	NORAD: Exercise tape mistaken for reality	United States	Exercise scenario tape causes nuclear alert
3 June 1980	NORAD: Faulty computer chip	United States	Faulty computer chip
25 September 1983	Serpukhov-15	Soviet Union	Technical error
7–11 November 1983	Able Archer-83	Soviet Union, United States	Misperception of military training exercise
18–21 August 1991	Failed coup	Soviet Union	Loss of command and control structure
25 January 1995	Black Brant scare	Russia	Mistaken identity of research rocket launch
May–June 1999	Kargil crisis	India, Pakistan	Conflict escalation
December 2001–October 2002	Kashmir standoff	India, Pakistan	Conflict escalation

1. Introduction

Nuclear weapons have not been detonated in violent conflict since 1945. The decades since then are commonly perceived – particularly in those countries that possess nuclear weapons – as an era of successful nuclear non-use and a vindication of the framework of nuclear deterrence logic.¹ In this narrative, the fear of massive retaliation and set of behaviours are presented as having prevented the use of nuclear weapons. Yet since 1945 there have been disturbing near misses in which nuclear weapons were nearly used inadvertently. Evidence from many declassified documents, testimonies and interviews suggests that the world has been lucky given the instances in which nuclear weapons were nearly used owing to miscalculation or error. A shared belief in nuclear deterrence is not the only plausible explanation for our escape from nuclear war; rather individual decision-making, often in disobedience to protocol and political guidance, has on several occasions saved the day. Whereas the popularized image of the ‘Moscow–Washington hotline’ gives the illusion that vital communication in times of crisis is possible, these incidents reveal the reality that the possessors of nuclear weapons will continue to be distrustful of one another and remain reliant on data transmitted by systems that are vulnerable to error or misjudgment, particularly when leaders have to respond too quickly to be able to make fully informed decisions.

Contemporary scenarios and risks, such as fragmented states or a terrorist takeover, present new dangers that may benefit from further consideration of incidents when nuclear weapons were nearly used in the past, why they were not used, and how to avoid such near misses in the future. Even in highly stable states, recent examples of poor control of nuclear weapons and materials are giving rise to concerns about laxity in safety, security, and command and control. These include:

- the August 2007 incident when a US Air Force B-52 bomber was flown from Minot Air Force Base to Barksdale Air Force Base, apparently without the pilot and crew being aware of the fact that it was armed with six nuclear-tipped cruise missiles, and without authorization;
- a collision in February 2009 between the nuclear-armed UK *HMS Vanguard* and French *Le Triomphant*;²
- the Y-12 nuclear facility break-in by three Plowshares protesters in July 2012;³
- recent revelations about security vulnerabilities on L’Île Longue, which hosts France’s four ballistic missile submarines;⁴ and
- long-term concerns regarding competent personnel and strategic organizational change highlighted by the 2012–13 report by the Defence Nuclear Safety Regulator to the UK Ministry of Defence.⁵

These demonstrate that the risks associated with nuclear weapons were not only Cold War phenomena, but are still happening today.

In addition, if nuclear weapons continue to be important components of military doctrines, the risk of their use, whether inadvertent or through misjudgment, will remain. Given the humanitarian consequences of a nuclear conflict regionally and globally, the risks should be subjected to greater analysis and examination than currently exists, and developed as a key factor within contemporary discussions of nuclear weapons doctrines and postures, and in non-proliferation and disarmament policies. These are issues and debates that affect all populations, and so such debates do not belong only in the possessor states or expert communities; rather they require an open airing involving as many voices as possible.⁶

¹ This is based on the assumption that the correlation between the absence of use and the existence of nuclear weapons is a monocausal relation; it also assumes that the period can be considered as peaceful and that its duration is exceptional, all of which has been called into question. Siverson, Randolph M. and Ward, Michael D. (2002), ‘The Long Peace: A Reconsideration’, *International Organization*, Vol. 56, No. 3, Summer. Many other factors have arguably come into play and there is a literature arguing that peace was achieved in spite of nuclear deterrence rather than thanks to it. This was because of the risky and coercive nature of such a strategy and of its adverse effects, including an overconfidence in the possibility of nuclear crisis management. See, among other works, Luard, Evan (1986), *War in International Society. A Study in International Sociology* (I. B. Tauris), p. 396; Mueller, John (1988), ‘The Essential Irrelevance of Nuclear Weapons. Stability in the Postwar World’, *International Security*, Vol. 13, No. 2, Fall; Vasquez, John ‘The Deterrence Myth: Nuclear Weapons and the Prevention of Nuclear War’, in Kegley, Charles (ed.) (1991), *The Long Postwar Peace* (HarperCollins); Brown, Andrew and Arnold, Lorna (2010), ‘The Quirks of Nuclear Deterrence’, *International Relations* Vol. 24, No. 3; Pinker, Steven (2011), *The Better Angels of Our Nature. Why Violence Has Declined* (Viking), pp. 268–78; Avery, John Scales (2012), ‘Flaws in the Concept of Nuclear Deterrence’, *CADMUS*, Vol. 1, No. 4, April. On the crisis management side, which is particularly relevant to this study, see Lebow, Richard Ned (1987), *Nuclear Crisis Management: A Dangerous Illusion* (Cornell University Press), and George, Alexander (ed.) (1991), *Avoiding War: Problems of Crisis Management* (Westview Press).

² ‘Nuclear subs collide in Atlantic’, BBC News, 16 February 2009, <http://news.bbc.co.uk/1/hi/7892294.stm>; UK Ministry of Defence, ICO CASE REFERENCE FS50444068, MOD Ref. D/CIO/3/18/612 (21-12-2011-141621-001), <http://nuclearinfo.org/sites/default/files/Submarine%20collision%20FOI%20release%20270213.pdf>.

³ Hosenball, Mark (2012), ‘Oak Ridge uranium plant shut after protesters breach 4 fences, reach building’, Reuters, 2 August, <http://uk.reuters.com/article/2012/08/02/us-usa-security-nuclear-idUSBRE8711LG20120802>.

⁴ Chambonnière, Hervé (2013), ‘Île Longue. Les incroyables failles dans la sécurité’ [Île Longue. Incredible security breaches], *Le Télégramme de Brest*, 11 June, <http://www.letelegramme.fr/ig/generales/fait-du-jour/ile-longue-des-failles-dans-la-securite-11-06-2013-2132250.php>.

⁵ Defence Nuclear Safety Regulator Annual Report 2012/2013 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/212708/dnsr_annual_report_2012_2013.pdf.

⁶ See Pelopidas, Benoît (2011), ‘The Oracles of Proliferation: How Experts Maintain a Biased Historical Reading that Limits Policy Innovation’, *Nonproliferation Review*, Vol. 18, No. 1, March; and Pelopidas, Benoît (2013), ‘Innovation in Nuclear Thinking: Incompetent, Dangerous or Futile?’, paper presented at the Program on Science and Global Security, Princeton University, 10 April.

Recent research⁷ has shed light on incidents of near nuclear use, largely owing to technical and human errors, but what has been less examined is the ‘human judgment factor’ in these cases.⁸ This ‘judgment’ includes the role of individual decision-making to break protocol and prevent the use of nuclear weapons. Such judgments have been made in situations of escalating tensions resulting from misunderstanding or lack of communication, and by individuals in emotional states of fear and fatigue. While safety and security technology and training may be improved in response to a recent rise in reports of near accidents and sloppy practices, human judgment is more difficult to address. So far, the judgments have favoured caution, often in violation of protocol. But how sustainable is this over time? Does this apply to all countries with nuclear weapons? Can more steps be taken to mitigate these risks?

Building on an analysis of cases of near nuclear use and recent sloppy practices, this report presents some of the risks associated with nuclear weapons that have previously been underappreciated and explores their implications for contemporary nuclear weapons policies. The report addresses the following questions:

- What are key instances of near nuclear use?
- What led to such incidents and what prevented nuclear weapons from being used?
- What is the significance of nuclear near misses for the humanitarian approach to nuclear weapons?
- How might analysis of past instances help us better assess contemporary risks?
- What additional measures can be taken now to prevent inadvertent use and ‘sloppy practices’?

Using a risk lens based on factoring probability and consequence, the report starts by examining the broader consequences of nuclear risk from a humanitarian perspective. It then provides a brief summary of the cases in chronological order. While little is publicly known about incidents involving China or North Korea, these two countries are discussed briefly as the lack of known

incidents should not suggest they are exempt from cases of near inadvertent use or nuclear risk. On the contrary, persistent opacity should warn against the illusion of complete knowledge regarding those risks.

To be clear, this report does not list or examine nuclear weapons accidents or near-accidents, such as those highlighted recently by Eric Schlosser.⁹ It also does not capture cases of fissile material accidents or sloppy practices leading to fissile material being unaccounted for.¹⁰ Instead, the report analyses cases in which nuclear weapons use was contemplated and nearly occurred owing to misjudgment and misperception. It also includes cases of recent ‘sloppy practices’ deriving from laxity in safety and security procedures. Though these do not necessarily involve the near use of nuclear weapons, they do demonstrate that nuclear risks have not been limited to the Cold War, that nuclear safety organizations often overestimate their control, and that there is an enduring need for vigilance in the management of nuclear weapons.

These cases also demonstrate the role of prudent judgment in preventing the inadvertent use of nuclear weapons. Cases range from those that occurred during a time of crisis, such as the Cuban missile crisis, to ‘bolts from the blue’, such as the ‘Black Brant’ incident. While some historians have suggested that there was also a nuclear dimension to the resolution of the Berlin crisis (1961), the focus on the role of *human factors* such as prudent judgment in preventing the use of nuclear weapons means that it is not included as a case-study, mainly because of the evidence suggesting that the chain of escalation during this crisis was driven by mutual strategic ‘hedging’, and not by misperception or miscalculation. Similarly, the case of Dien Bien Phu is not included, even though it has been suggested the United States considered transferring nuclear weapons to the French at the time.¹¹

While every attempt has been made to cross-check all information and provide multiple sources, owing to the sensitive nature of the material many cases were not as well documented as would have been ideal. This is largely owing to the classification of documents by nuclear possessor states for the purposes of protecting nuclear

⁷ See, for example, Schlosser, Eric (2013), *Command and Control: The Damascus Accident and the Illusion of Safety* (Allen Lane); Gregory, Sean (1989), *The Hidden Costs of Deterrence: Nuclear Weapons Accidents* (Brassey’s); Sagan, Scott (1993), *The Limits of Safety: Organizations, Accidents and Nuclear Weapons* (Princeton University Press); and Hoffman, David (2010), *The Dead Hand: The Untold Story of the Cold War Arms Race and its Dangerous Legacy* (Anchor Books). Other research includes Forden, Geoffrey (2011), ‘False Alarms on the Nuclear Front’, *PBS*, 1 June, <http://www.pbs.org/wgbh/nova/missileers/falsealarms.html>, and Phillips, Alan F. (1998), ‘20 Mishaps that Might Have Started Accidental Nuclear War’, Nuclear Age Peace Foundation, January, http://www.wagingpeace.org/articles/1998/01/00_phillips_20-mishaps.php.

⁸ The Damascus Accident in Arkansas is told in detail in Schlosser, *Command and Control*, pp. 240–42, 390–92, 439–40.

⁹ Schlosser, *Command and Control*.

¹⁰ Such a list would include 100 kilogrammes of weapons-grade uranium from a nuclear plant in Pennsylvania in the 1960s but also large quantities unaccounted for in Japan and Europe since the 1980s, in the United States during the entire Cold War and the challenges of accounting for South Africa’s production of uranium. See Sokolski, Henry D., ‘Preface’, in Sokolski, Henry D. and Tertrais, Bruno (eds) (2013), *Nuclear Weapons Security Crises: What Does History Teach Us?* (US Army War College), p. x.

¹¹ See, for example, Roy, Jules (2002), *The Battle of Dien Bien Phu*. We are grateful to Eric Schlosser for pointing this out.

secrets and national security, but also perhaps to prevent embarrassment and/or public criticism. There are security apparatuses that have vested interests in protecting such information, and those responsible for errors will most likely not be willing to expand on them to the public. In part the study relies on government statements and documents, which should be subjected to a critical lens given their vested interest in the events. The latest scholarship on the issue shows that time alone will not necessarily lead to a greater awareness and prevention of sloppy practices, and processes of declassification are in no way linear or global. Even after the creation of the US National Declassification Center in 2009, for example, there is still excessive secrecy in the United States owing to competition between agencies and contradictory processes of over-classification, declassification and reclassification.¹²

At the same time, the most forthcoming and transparent states are being subjected to increased scrutiny precisely as a result of their provision of more information. This may appear unfair, and the hope is that all nuclear weapons possessors could see the value of transparency and accountability measures as part of good and safe practice protocols. The intent here is not to suggest these states are more risk-prone than others. Indeed, states such as the United Kingdom and United States, which provide relatively more information about near misses than others, should not be punished for this transparency, but rather commended. Indeed, one key finding of this report is the need for greater transparency and information about such cases because there remains much that is simply not publicly known.

The report concludes with a list of findings and policy recommendations. The latter include buying time in nuclear decision-making, exploring trust- and confidence-building measures, involving a wider set of decision-makers in nuclear policy, and increasing training and awareness of nuclear weapons effects.

¹² For an overview of those problems, see Zegart, Amy B. (2010), “‘Spytainment’: The Real Influence of Fake Spies”, *Journal of Intelligence and Counterintelligence*, Vol. 24, No. 3, and for a specific focus on the nuclear component, Jones, Nate (2013), ‘Countdown to Declassification: Finding Answers to a 1983 Nuclear War Scare’, *Bulletin of the Atomic Scientists*, Vol. 69, No. 6.

2. Framing Risk: Probability and Consequences

Risk is the combination of two factors: probability and consequence.¹³ In order to establish the risk that we face, it is normally expressed as a formula by multiplying the probability that an event will occur by the consequences of that event occurring: $Risk = Probability \times Consequence$.

Another way to express this is that risk is the probability that a situation will produce specific harms under specified conditions. A high risk, for example, may have a low probability but a high impact.¹⁴ Assessing the risks requires an understanding of possible likelihoods and the full range of outcomes. Risk cannot be given a single number – rather it is generally assessed as low, medium or high through the use of a risk matrix, and the probability and consequences change over time as new information is garnered and understood. For example, as more has been learned about the probability that climate change is occurring and about its consequences, the more understanding of the increased risks has improved. The global financial market crash of 2008 also demonstrated the risk of low-probability, high-impact events. The literature on the impact of the highly improbable or ‘black swan’ events – those that are almost impossible to predict because they are beyond our knowledge and experience – provides sombre reading for those addressing the issue of nuclear weapons.¹⁵

This risk lens raises the question of whether there is an acceptable risk level when it comes to nuclear weapons. From an outsider perspective, much of what is known about the probability and consequences, and hence the risks, of a nuclear detonation depends on what is known, as well as so-called known unknowns and unknown unknowns.¹⁶ In terms of probabilities, lack of information makes it difficult to provide an accurate estimate of all instances when nuclear weapons were nearly used. Compared with the airline industry, which employs risk awareness based on open information of the in-depth analysis of accidents and acts upon the analysis in order to restore public confidence, nuclear weapons risk assessments are deliberately withheld from the public and are not subject to open scrutiny.

For example, the United States previously attempted to explore this question with regard to nuclear weapons. In

1955, the Army’s Office of Special Weapons Developments issued a report titled *Acceptable Military Risks from Accidental Detonation of Nuclear Weapons*, which set an acceptable risk level from a nuclear detonation equivalent to that of earthquakes and natural disasters in the United States over the previous 50 years. The report stated that:

According to that formula, the Army suggested that the so-called acceptable probability of a hydrogen bomb detonating within the United States should be 1 in 100,000 during the course of a year. The so-called acceptable risk of an atomic bomb going off was set at 1 in 125.¹⁷

In 1957, the Armed Forces Special Weapons Project offered another set of so-called acceptable probabilities. The odds of a hydrogen bomb exploding accidentally during the entire lifetime of the weapon should be lower than one in 10 million, with the lifespan of the weapons assumed to be 10 years.¹⁸

In the last few years, there is evidence that the perceived nuclear risk calculation is shifting upwards again.

A nuclear weapon detonation has been considered over recent decades to be an event with a low probability of occurring but with an extraordinarily large set of consequences. For that reason, many analysts have treated this as a high risk. During the Cold War, there were periods when the probability of use became much higher than at other times, such as during times of crisis or proxy conventional wars. Over the last 25 years, the risk has been perceived as lower because the end of the Cold War suggested probabilities of use would be lower and the number of warheads has decreased by two-thirds since 1986.¹⁹ However, in the last few years, there is evidence that the perceived nuclear risk calculation is shifting upwards again. There are several reasons for this shift in risk perception.

First, the number of nuclear weapons possessors has increased and newcomers are in regions of high tension, notably South and Northeast Asia. Figure 1 captures this trend.

¹³ For a thoughtful consideration of risk see Kaplan, Stanley and Garrick, John B., ‘On the Quantitative Definition of Risk’, *Risk Analysis*, Vol. 1, No. 1, 1981, in which the authors state (pp. 11–27): ‘we prefer, to say that “risk is probability and consequence.” In the case of a single scenario the probability times consequence viewpoint would equate a low-probability high-damage scenario with a high-probability low-damage scenario – clearly not the same thing at all. In the case of multiple scenarios the probability times consequence view would correspond to saying the risk is the expected value of damage, i.e., the mean of the risk curve. We say it is not the mean of the curve, but the curve itself which is the risk. A single number is not a big enough concept to communicate the idea of risk. It takes a whole curve. Now the truth is that a curve is not a big enough concept either. It takes a whole family of curves to fully communicate the idea of risk.’

¹⁴ See Lee, Bernice, Preston, Felix and Green, Gemma (2012), *Preparing for High-impact, Low-probability Events: Lessons from Eyjafjallajökull*, Chatham House.

¹⁵ Nicholas Taleb, Nassim (2008), *The Black Swan: The Impact of the Highly Improbable* (Random House).

¹⁶ Kahneman, Daniel (2011), *Thinking Fast and Slow* (Penguin).

¹⁷ Schlosser, *Command and Control*, p. 171.

¹⁸ *Ibid.*, pp. 171–72.

¹⁹ Kristensen, Hans M. and Norris, Robert S. (2013), ‘Global Nuclear Weapons Inventories, 1945–2013’, *Bulletin of the Atomic Scientists*, Vol. 69, No. 5.

Figure 1: Number of nuclear weapons possessors – trend since 1945



Source: Authors.

Second, nuclear weapons possessor states continue to depend on these weapons for their security, despite the end of the Cold War. Although the number of nuclear weapons and their delivery systems has decreased in four of the five Non-Proliferation Treaty (NPT) nuclear weapon states,²⁰ nuclear arsenals are increasing in three of the non-NPT states and remain significant in military doctrines.

Third, the threat of nuclear terrorism, which is assessed very differently across countries and experts, adds to the overall nuclear risk.

Fourth, as this report and others show, it is likely that the probability of nuclear use or accident has hitherto been underestimated. In the post-Cold War period, the general sense was that the risks had decreased in part because the probability of deliberate use had decreased dramatically. However, the risk of inadvertent use and the risk of accident have not been factored in adequately. The risk perceptions should be reconsidered in the light of information on near misses and near accidents.

Fifth, the consequences of use are being revised upwards. There is an increasing recognition that there would be

limited or no adequate humanitarian response immediately following a nuclear detonation. More specifically, it is now well established that estimates of destruction made by the US nuclear war planning community underestimated the fire effects of nuclear explosions.²¹ Another body of scholarship suggests that the smoke resulting from nuclear weapons detonation, even on a limited scale, could block sunlight to such an extent that it would place up to two billion people at risk of starvation as a result of agricultural failure.²² While arguments about the extreme scenario of a nuclear winter remain controversial, any nuclear explosion would inevitably result in a massive humanitarian catastrophe.

Given the doctrines and targeting policies of nuclear possessor states, which do not categorically rule out the use of nuclear weapons against non-nuclear weapon states, along with their failure to ratify all treaties establishing nuclear weapon free zones that would prohibit the use of nuclear weapons in certain regions, the issue of nuclear vulnerability is a global problem. No one is exempt from it.²³ In addition, the immediate consequences of detonation and the realization of the inadequacy of the humanitarian response are being factored into response plans by large international aid and development organizations. For example, the International Committee of the Red Cross (ICRC) has stated that ‘there is presently no effective capacity at the international level to deliver appropriate humanitarian assistance to survivors if nuclear weapons were ever to be used’.²⁴

This lack of capacity was demonstrated in the confused response to Fukushima, for example. It is important not to conflate civilian nuclear emergencies with nuclear weapons detonations, however. A nuclear weapon detonation in a populated area would be likely to dwarf the challenges and effects of the 2011 Tōhoku earthquake, tsunami and the Fukushima crisis combined. A study by the UN Office for the Coordination of Humanitarian Affairs (OCHA) on humanitarian and emergency response to Fukushima found

²⁰ The overall number of nuclear weapons has markedly decreased since the end of the Cold War. The United States and Russia have reduced their stockpiles significantly and, of those weapons that remain, most have been taken into storage. By the end of 2012, the United States had about 7,700 nuclear warheads in total, Russia about 9,000, France 300, China 240, the United Kingdom 215, India approximately 80–100, Pakistan approximately 90–110 and Israel perhaps 80 (see *SIPRI Yearbook 2013: Armaments, Disarmament and International Security* (Oxford University Press)). Nevertheless, the United States and Russia each has about 900 nuclear warheads on full alert, i.e. deployed and on delivery vehicles and that can be launched in minutes or hours (Kristensen, Hans M. and McKinzie, Matthew (2012), *Reducing Alert Rates of Nuclear Weapons* (UNIDIR)).

²¹ Eden, Lynn (2004), *Whole World on Fire: Organizations, Knowledge and Nuclear Weapons Devastation* (Cornell University Press).

²² Helfand, Ira (2013), *Nuclear Famine: Two Billion People at Risk?: Global Impacts of Limited Nuclear War on Agriculture, Food Supplies, and Human Nutrition* (International Physicians for the Prevention of Nuclear War), <http://climate.envsci.rutgers.edu/pdf/nuclear-famine-report.pdf>; Robock, Alan and Brian Toon, Owen (2012), ‘Self-Assured Destruction. The Climate Impact of Nuclear War’, *Bulletin of the Atomic Scientists*, Vol. 68, No. 5, and Robock, Alan and Lili, Xia (2013), ‘Impacts of a Nuclear War in South Asia on Rice Production in Mainland China’, *Climatic Change*, Vol. 116.

²³ Pelopidas, Benoît (2013), ‘Avoir la bombe, repenser la puissance dans un contexte de vulnérabilité nucléaire globale’ [‘Having the bomb. Rethinking power in a context of global nuclear vulnerability’], CERIScope, November, available at <http://ceriscope.sciences-po.fr/puissance/content/part1/avoir-la-bombe-repenser-la-puissance-dans-un-contexte-de-vulnerabilite-nucleaire-globale?page=show> [accessed 01/04/2014].

²⁴ On the gap between the framing of nuclear weapons issues in terms of resilience and the provisions for it, with a focus on the British case, see Pelopidas, Benoît and Weldes, Jutta, ‘British Nuclear Interests: Security, Resilience and Trident’, in Edmunds, Timothy, Porter, Robin and Gaskarth, Jamie (eds) (forthcoming, 2014), *British Foreign Policy and the National Interest* (Palgrave); International Committee of the Red Cross, note of 3 March 2013, <http://www.icrc.org/eng/resources/documents/legal-fact-sheet/03-19-nuclear-weapons-humanitarian-assistance-3-4132.htm>.

that 'according to current terminology and to the way in which humanitarian operations are understood by the stakeholders, there is little ground to consider major nuclear accidents as humanitarian crises in the traditional sense'.²⁵

A recent international initiative attempts to highlight these consequences and subsequent risks. In March 2013, the first Conference on the Humanitarian Impact of Nuclear Weapons was hosted by Norway in Oslo, bringing together 128 states and civil society groups to engage in a facts-based discussion on how nuclear weapons work, to socialize research on the effects of a nuclear detonation, and to learn about the impact nuclear weapons have already had on humanity through nuclear testing and accidents. The Humanitarian Impact of Nuclear Weapons Initiative is part of a new discourse of nuclear weapons in a non-traditional forum, separate from political debates.²⁶ A second conference was hosted by Mexico in early 2014, with 146 states participating along with many academics and civil society representatives.²⁷

To a certain extent, nuclear deterrence strategies depend on risk, unpredictability and extreme consequences. For example, Pakistan's strategic doctrine of engagement with India rests on a possibility that limited (conventional) wars can 'get out of hand'.²⁸ Nuclear weapons do not necessarily have the intended deterrent effect and for small nuclear arsenals the quest for such an effect requires a posture of asymmetric escalation that increases the pressure on the command and control systems, and could lead to accidental launch or misperceptions.²⁹ Given that deterrence is based on risk-taking, and nuclear possessor states all practise a deterrence policy, it should be expected that a history of the nuclear age includes cases of near nuclear use and that there will be similar instances in the future.

²⁵ UN Office for Coordination of Humanitarian Affairs, 'Linking Humanitarian and Nuclear Response Systems', p. 3, <https://ochanet.unocha.org/p/Documents/Linking%20Humanitarian%20and%20Nuclear%20Response%20Systems.pdf> [accessed 27/01/14].

²⁶ Lewis, Patricia and Williams, Heather, 'The Meaning of the Oslo Conference on the Humanitarian Impacts of Nuclear Weapons', in Borrie, John and Caughley, Tim (eds) (2013), *Viewing Nuclear Weapons through a Humanitarian Lens* (UNIDIR, United Nations Publications).

²⁷ Second Conference on the Humanitarian Impact of Nuclear Weapons, www.sre.gob.mx/en/index.php/humanimpact-nayarit-2014.

²⁸ Foreign Minister Jalil Jilani is quoted as using this phrase in Kapur, S. Paul (2005), 'India and Pakistan's Unstable Peace: Why Nuclear South Asia Is Not Like Cold War Europe', *International Security*, Vol. 30, No. 2 (Fall), p. 145.

²⁹ Narang, Vipin (2013), 'What Does It Take to Deter? Regional Power Nuclear Postures and International Conflict', *Journal of Conflict Resolution*, Vol. 51, No. 3, June. On how the nuclear discourse of 'deterrence' and 'non-proliferation' mixes actual effects with intended effects, see Pelopidas, 'Innovation in Nuclear Thinking: Incompetent, Dangerous or Futile?'

3. Cases

Data and information on near nuclear weapons use are scant. Secrecy, classification issues and the desire of many nuclear weapons possessors to reassure allies and opponents and to protect their public images as responsible nuclear powers have resulted in a close hold on such information. Thanks to persistent interest and dogged research in this area in recent years, however, largely among civil society and advocacy organizations and journalists, coupled with a move towards declassification and freedom of information in some countries, a number of cases of near nuclear weapons use have come to light. The number of these revealed cases is still relatively small. This could be due to a genuine lack of serious incidents or to the continuing competing challenges of transparency and secrecy in nuclear weapons possessor governments. Whatever the reason, these cases offer a starting point and contribution to research and thinking about nuclear weapons. Table 1 lists the cases examined in this report and includes a brief note on the cause of each.

Some words of caution are necessary about these case studies. First, they do not represent the full set of incidents. They are presented here as a demonstration that such events have occurred and should be thought about, analysed, understood and acted upon. The incidents discussed here may represent a comprehensive list or they may be only the visible part of a much larger iceberg of events. This may not be known for decades to come.

Second, our interpretations and those of other scholars laid out in this report are not the only interpretations applicable

to the case studies; alternative interpretations are welcome as part of an honest effort to understand the true risks associated with nuclear weapons.

Poor practices in nuclear weapons management have occurred at all levels of decision-making in the past, are still happening today and are likely to continue in the future.

Third, it is clear from the case studies that military doctrines and political systems matter when it comes to nuclear weapons decision-making. Therefore one specific example in one country does not necessarily imply that such a situation could occur in another.

Fourth, and conversely, just because an incident occurred in one country does not mean that other states are exempt from similar situations. A touch-and-go decision in one country that did not lead to the use of nuclear weapons could have resulted – or may yet result – in a far worse outcome in another. When it comes to nuclear weapons and decision-making in the heat of the moment, caution against complacency would seem the prudent approach.

Poor practices in nuclear weapons management have occurred at all levels of decision-making in the past, are still happening today and are likely to continue in the future. This chapter demonstrates their ubiquity across time, locations and levels of responsibility.

Table 1: Incidents of near nuclear use

Date	Incident	States involved	Cause
October 1962	Operation Anadyr	Soviet Union	Miscommunication
27 October 1962	British nuclear forces during the Cuban missile crisis	United Kingdom	Conflict escalation
27 October 1962	Black Saturday	United States	Conflict escalation and miscommunication
22 November 1962	Penkovsky false warning	Soviet Union	Espionage
October 1973	1973 Arab–Israeli war	Israel	Conflict escalation
9 November 1979	NORAD: Exercise tape mistaken for reality	United States	Exercise scenario tape causes nuclear alert
3 June 1980	NORAD: Faulty computer chip	United States	Faulty computer chip
25 September 1983	Serpukhov-15	Soviet Union	Technical error
7–11 November 1983	Able Archer-83	Soviet Union, United States	Misperception of military training exercise
18–21 August 1991	Failed coup	Soviet Union	Loss of command and control structure
25 January 1995	Black Brant scare	Russia	Mistaken identity of research rocket launch
May–June 1999	Kargil crisis	India, Pakistan	Conflict escalation
December 2001–October 2002	Kashmir standoff	India, Pakistan	Conflict escalation

In addition to the cases of near inadvertent use based on the crucial 'human judgment factor', other trends and 'sloppy practices' are worth mentioning. Failures in oversight by heads of state are less often reported, but potentially catastrophic. For instance, in May 1981, the newly elected president of France, François Mitterrand, accidentally left the launch codes given to him by his predecessor at home, in the suit he was wearing the day before.³⁰ A retired US Army colonel reports that a similar experience happened to President Jimmy Carter, whose suit went to the dry cleaner.³¹

An additional concern is the drinking habits and use of psychotropic substances by heads of state with the authority to launch a nuclear strike, such as Richard Nixon (1968–74) and Boris Yeltsin (1991–99).³² An additional risky practice was Nixon's use of nuclear weapons for coercive diplomacy towards the Soviet Union and North Vietnam in October 1969.³³ A Nixonian attitude towards deterrence and unpredictability is cause for concern, as exemplified in Nixon's comment that 'if the adversary feels that you are unpredictable, even rash, he will be deterred from pressing you too far. The odds that he will fold increase greatly, and the unpredictable president will win another hand.'³⁴

Nuclear safety and security teams and top-level military personnel are also occasionally prone to sloppy practices. For instance, in the early 1960s, NATO weapons handlers pulled the arming wires out of a Mark 7 nuclear warhead while they were unloading it from a plane. As Schlosser reported:

When the wires were pulled, the arming sequence began – and if the X-Unit charged, a Mark 7 could be detonated by its radar, by its barometric switches, by its timer or by falling just a few feet from a plane and landing on a runway.³⁵

In another incident, on 16 January 1961, at the Lakenheath Air Base in Suffolk, England, when the pilot started the engines of his F-100D fighter carrying a Mark 28 hydrogen bomb, the underwing fuel tanks were mistakenly jettisoned, and ruptured when they hit the runway.³⁶ In February 1974, US Senator Sam Nunn spent two weeks in Europe visiting US NATO bases. He reported that 'there were people guarding nuclear weapons [who] were hooked on drugs'.³⁷ Overall, between 1975 and 1977, 120,000 members of the US military forces had direct contact with nuclear weapons. Over the years, a large number of servicemen and servicewomen have been removed from their posts for alcohol and drug abuse, and delinquency.³⁸

Sloppy practices may not always have such benign outcomes as in the past, and they increase the likelihood of inadvertent use and thus heighten the risks associated with nuclear weapons.³⁹ As this discussion and the cases below demonstrate, there have been numerous occasions in which nuclear weapons use was contemplated and sloppy practices or mismanagement endangered the safety and security of these weapons.

Cuban missile crisis cases

October 1962, Soviet Union, Operation Anadyr

On 1 October 1962, the Soviet Union dispatched a squadron of four submarines – B-4, B-36, B-59, and B-130 – on a secret mission to the Atlantic Ocean, codenamed Operation Anadyr. Each submarine was armed with three 15kt nuclear torpedoes. En route from Kola Bay, they received further instructions that they would be stationed in the Sargasso Sea in order to protect Soviet forces that were to be deployed in Mariel, Cuba. They arrived during the week of 22 October, the same week that the US naval blockade of Cuba began.

³⁰ Séguéla, Jacques (2006), 'La clé atomique' ['The Atomic Key'], *Le Nouvel Observateur*, 5–11 January; Gairin, Victoria (2012), 'Derrière les murs du Château' ['Behind the Walls of the Castle'], *Le Point*, 29 March.

³¹ David Hackworth summarizes some cases in 'Hell in a Handbasket', *Maxim*, January 2001, <http://www.hackworth.com/maxim012001.html>.

³² Among many sources on Nixon's drinking problem during his presidency, see Small, Melvin (2003), *The Presidency of Richard Nixon* (University Press of Kansas), pp. 18, 220; and Hersh, Seymour M. (1982), *Kissinger: The Price of Power. Henry Kissinger in the Nixon White House* (Faber & Faber), pp. 88, 108–10, 190–91, 396, 513. On an episode of heavy drinking while Yeltsin was a guest at Blair House in 1995, see Branch, Taylor (2009), *The Clinton Tapes. Wrestling History with the President* (Simon & Shuster), pp. 198–99. John F. Kennedy's reliance on painkillers was also a potential cause of concern. The gate logs at the White House suggest that the so-called 'Doctor Feelgood', i.e. Max Jacobson, visited Kennedy more than thirty times: O'Brien, Michael (2005), *John F. Kennedy: A Biography* (St Martin's Press), pp. 761–64. See also Dallek, Robert (2002), 'The Medical Ordeals of Kennedy', *The Atlantic Monthly*, December, available at <http://www.theatlantic.com/past/docs/issues/2002/12/dallek.htm>.

³³ Sagan, Scott and Suri, Jeremy (2003), 'The Madman Nuclear Alert: Safety, Secrecy and Signalling in October 1969', *International Security*, Vol. 27, No. 4, Spring.

³⁴ Nixon, Richard (1980), *The Real War* (Warner Books), pp. 253–55.

³⁵ Schlosser, *Command and Control*, p. 261, based on interviews with weapon designer Harold Agnew. 'A screwdriver was found inside one of the bombs; an Allen wrench was somehow left inside another.'

³⁶ *Ibid.*, p. 262.

³⁷ Taubman, Philip (2012), *The Partnership: Five Cold Warriors and their Quest to Ban the Bomb* (Harper & Collins), p. 201. For additional evidence about drug use in the US Air Force at the time, see also 'Eric Schlosser on US nuclear weapons: "People are getting sloppy"', *The Guardian*, 25 October 2013, <http://www.theguardian.com/world/2013/oct/25/eric-schlosser-nuclear-weapons-command-control>.

³⁸ Kringle, Einar, 'The Myth of Rationality in Situations of Crisis', in Gromyko, Anatoly A. and Hellman, Martin E. (eds) (1988), *Breakthrough: Emerging New Thinking* (Walker and Company), p. 64. More broadly, on this issue, see Abrams, Herbert L. (1991), 'Human Reliability and Safety in the Handling of Nuclear Weapons', *Science and Global Security*, No. 2.

³⁹ Pelopidas, Benoit (2013), 'Why Nuclear Realism is Unrealistic', *Bulletin of the Atomic Scientists*, 26 September, <http://thebulletin.org/why-nuclear-realism-unrealistic>.

All four submarines were authorized to launch a nuclear attack independently from central command. The precise orders were for the submarine commanders to use their nuclear torpedoes in the event of a pressure hull rupture caused by the use of depth charges, if the submarine was under fire while surfaced, or if ordered to by Moscow.⁴⁰ In B-4, B-36 and B-130, the launch of a nuclear torpedo could be authorized if there was a consensus between each submarine's political officer and captain that it was under serious threat. In B-59, the launch of a nuclear torpedo required the consensus of three senior officers on board.

The Soviet Union had been notified of the United States' intent to drop practice depth charges as part of its blockade around Cuba, but this information was not relayed to any of the submarine commanders

The Soviet Union had been notified of the United States' intent to drop practice depth charges (PDC) as part of its blockade around Cuba, but this information was not relayed to any of the submarine commanders. Unaware that the depth charges that hit B-59 were PDC intended to force the submarine to the surface, Captain Valentin Savitsky said '[w]e're going to blast them now! We will die, but we will sink them all – we will not disgrace our navy!'⁴¹ It also appears that Savitsky was unable to communicate with the Soviet General Staff at the time, and therefore was under pressure to retaliate without being able to clearly assess the nature and context of the risk that the submarine faced: '[m]aybe the war has already started up there, while we are doing summersaults here'.⁴² Damage was also done to the radio antennas on B-59 and two other submarines. A subsequent Soviet report maintained this could have been due to the use of live depth charges.⁴³ But as a result three of the submarines' radio antennas, including those on B-59, could not receive all radio communications. Second Captain Vasili Alexandrovich Arkhipov was able to intervene and convince Savitsky he should await instructions from superiors in Moscow. The Commander of Special Assignment Group, Captain V.P. Orlov, also suggested that the Deputy Political Officer

onboard the submarine, Ivan Semenovich Maslennikov, had a role in convincing Savitsky to opt for sending an echo locator signal, and returning to the surface by 04:00 on 27 October.⁴⁴

In a similar situation, the commander of submarine B-130, Captain Nikolai Shumkov, ordered torpedoes to be readied in an effort to give his crewmen the impression that he was ready to launch a nuclear response to US bombardment. However, this was primarily because he was concerned that the political officer on board would report to superiors any reluctance to do so under crisis circumstances.⁴⁵

October 1962, United States, 'Black Saturday'

The term 'Black Saturday' is commonly used to refer to the shooting down of a US U-2 plane over Cuba at the height of the Cuban missile crisis. However, in a less well-known incident on the same day, a U-2 spy plane was lost over Soviet territory. On 27 October 1962 – the penultimate day of the crisis – a U-2 spy plane flown by Captain Charles Maultsby strayed into Soviet airspace while en route to Alaska. Maultsby had been on a mission to obtain radioactive air samples from the North Pole resulting from a recent Soviet nuclear test. During the mission, the aurora borealis made celestial navigation difficult. After experiencing communication problems, Maultsby received a message over the radio from the air rescue plane near Barter Island, northern Alaska that had been assigned to Maultsby's flight. He was instructed to navigate left until he could identify Orion. Yet soon afterwards he received another call from an unidentified voice instructing him to navigate 30 degrees right instead.

At 07:59 Alaskan time, Maultsby's plane breached Soviet airspace. He continued to receive radio communications of an unknown origin instructing him to navigate 35 degrees further to the right, which would take him deeper into Soviet territory. Suspicious, he presented a unique operation code to the signalling voice, but received no response. Having picked up Russian music over the radio, he realized that he was flying over Soviet territory and headed towards Alaska. Maultsby began signalling Mayday, and anticipating an emergency landing.

⁴⁰ Captain Ryurik Ketov, in Savranskaya, Svetlana V. (2005), 'New Sources on the Role of Soviet Submarines in the Cuban Missile Crisis', *Journal of Strategic Studies*, Vol. 28, No. 2, p. 240.

⁴¹ 'The Recollections of Vadim Orlov (USSR Submarine B-59): We Will Sink Them All, But We Will Not Disgrace Our Navy', in Mozgovoi, Alexander (2002), 'The Cuban Samba of the Quartet of Foxtrots: Soviet Submarines in the Caribbean Crisis of 1962' [Translated by Svetlana Savranskaya, The National Security Archive], *Military Parade*, n.p., <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB75/asw-II-16.pdf>.

⁴² *Ibid.*, n.p.

⁴³ 'Report: About participation of submarines "B-4," "B-36," B-59," "B-130" of the 69th submarine brigade of the Northern Fleet in the Operation "Anadyr" during the period of October-December, 1962' [Translated by Svetlana Savranskaya, The National Security Archive, <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB399/docs/Report%20of%20the%20submarine%20mission.pdf>].

⁴⁴ 'The Recollections of Vadim Orlov', n.p.

⁴⁵ Huchthausen, Peter A. (2002), *October Fury* (John Wiley), p. 209 (n. 8); Scott, Len (2007), *The Cuban Missile Crisis and the Threat of Nuclear War: Lessons from History* (Continuum), pp. 104–05.

As soon as Soviet military radar was able to detect the U-2 plane and project that it was headed towards Chukotka airbase, MiG fighter planes from bases at Chukotka and Anadyr were sent to chase it down. They followed the U-2 plane for 300 miles until they were forced to refuel. At around 09:28, Maultsby turned his systems offline in an effort to conserve enough fuel for an emergency landing, having less than 15 minutes' supply left.

It would take until just after 09:40 Alaskan time for Secretary of Defense Robert McNamara to be informed that a U-2 plane had been lost during this incident, with another U-2 plane permitted to fly the same course, and on the same mission, as Maultsby. The Alaska Air Command scrambled two F-102s to find and escort Maultsby; however, they had removed their conventional air-to-air missiles and replaced them with nuclear-tipped missiles.⁴⁶ Eventually, Maultsby ran out of fuel but was able to safely coast clear of Soviet airspace.

Premier Nikita Khrushchev would later state in a letter to President John F. Kennedy that a

dangerous case occurred on [27] October, when one of your reconnaissance planes intruded over Soviet borders in the Chukotka Peninsula area in the north and flew over our territory. The question is, Mr. President: How should we regard this. What is this: A provocation? One of your planes violates our frontier during this anxious time we are both experiencing, when everything has been put into combat readiness. Is it not a fact that an intruding American plane could be easily taken for a nuclear bomber, which might push us to a fateful step? And all the more so since the U.S. Government and Pentagon long ago declared that you are maintaining a continuous nuclear bomber patrol.⁴⁷

October 1962, United Kingdom, bombers placed on alert

Throughout the Cuban missile crisis, the United Kingdom, as one of the three states with operational nuclear weapons, was pivotal to a NATO strategy that embraced the willingness to use nuclear weapons in response to a

Soviet attack. From February 1962, as part of the British peacetime deterrent, each V-force squadron provided one fully armed aircraft and crew at 15 minutes' readiness to scramble to deliver its weapons on pre-planned targets beyond the Iron Curtain.⁴⁸ Throughout the crisis, 59 of the 60 Thor intermediate-range ballistic missiles (IRBM) stationed in Britain were put on full alert with this readiness state of 15 minutes. Moreover, all V-force aircrafts were fully equipped with their nuclear loads and crews were placed on heightened readiness levels.⁴⁹

On 27 October 1962, Prime Minister Harold Macmillan arranged a meeting of the Joint Chiefs of Staff of the Armed Forces. They were advised that the United States was planning an invasion of Cuba two days later. The Joint Chiefs set out steps that would require approval by an emergency cabinet meeting to put the United Kingdom on a full war footing. Macmillan made clear, however, that any steps must be unobtrusive so as not to heighten Soviet alarm, and he refrained from sending aircraft to their dispersal bases. Earlier, he had observed that 'mobilisation had sometimes caused war'.⁵⁰ In order to avoid drawing attention to the escalating state of readiness (DEFCON2), the warheads for the Thors were dispatched from Faldingworth to the Thor sites under cover of darkness. Instead of the normally easily recognizable nuclear convoys used to transport the weapons, an eyewitness recalls that the weapons were instead loaded into the back of normal three-tonne trucks and were 'sent on their way accompanied only by a single RAF Policemen and his trusty guard dog'.⁵¹

While ministers were kept in the loop regarding the high alert posture, only 'a handful of people outside Bomber Command' were given full details.⁵² But Sir Kenneth Cross, its commander in chief, maintained that the Bomber Command was kept at arm's length from the US Strategic Air Command as well as the British Air Ministry and that '[o]nce the Cuban Missile Crisis started there was no one at the end of the phone and there was no one at the end of the

⁴⁶ Dobbs, Michael (2008), *One Minute to Midnight: Kennedy, Khrushchev, and Castro on the Brink of Nuclear War* (Vintage Books), p. 264. Dobbs explains, 'This was standard procedure when the squadron moved to DEFCON-3 [the United States was at DEFCON-2 at the time]. Armed with a nuclear-tipped Falcon air-to-air missile, a lone F-102 could wipe out an entire fleet of incoming Soviet bombers. In theory, nuclear weapons could only be used on the authority of the president. In practice, an F-102 pilot had the physical ability to fire the nuclear warhead by pushing a few buttons on his control panel. Since he was alone in the cockpit, no one could override his decision.' This finding is consistent with Scott Sagan's in *The Limits of Safety* (pp. 136–37): 'Under normal peacetime conditions, conventionally armed interceptors would have been used. But because the Alaskan command was at DEFCON 3, the interceptors at Galena were armed with the nuclear Falcon air-to-air missiles and, under existing safety rules, were authorized to carry the weapons in full readiness condition in any "active air defense" mission. [...] The F-102A interceptors were therefore launched fully armed with nuclear Falcon missiles, and the only nuclear weapons control mechanism remaining was the discipline of the individual pilots in the single seat interceptors. The critical decision about whether to use a nuclear weapon was now effectively in the hands of a pilot flying over Alaska.'

⁴⁷ 'Letter from Chairman Khrushchev to President Kennedy', Department of State, Presidential Correspondence: Lot 66 D 204 [no classification marking]. It is important to note that Khrushchev's letter originally dated the event as occurring on 28 October, and other sources demonstrated similar confusion. However, the incident clearly occurred on 27 October as it was referred to in a meeting that morning by Secretary of State Dean Rusk. See the account from the secret meeting in the Cabinet Room on 27 October, in Stern, Sheldon M. (2005), *The Week the World Stood Still* (Stanford University Press), p. 160.

⁴⁸ Woolven, Robin (2012), 'Reflections on memory and Archives: RAF Bomber and Command during the 1962 Cuban Missile Crisis', *Britain and the World*, Vol. 5, No. 1, pp. 116–26, p. 117.

⁴⁹ This increased the number of squadron aircraft on Quick Reaction Alert from 3 to 6, although at least one squadron at RAF Waddington was reported to have generated nine Vulcans for QRA on 27 October 1962.

⁵⁰ Macmillan, Harold (1973), *At the End of the Day, 1961–1963* (Macmillan), p. 190.

⁵¹ 'Cuban Missile Crisis', Bomber County Aviation Resource, <http://www.bcar.org.uk/cuban-missile-crisis> [Accessed 01/10/13].

⁵² Twigg, Stephen and Scott, Len (2000), *Planning Armageddon: Britain, the United States and the Command of Western Nuclear Forces, 1945–1964* (Routledge), p. 4.

phone until the crisis was over'.⁵³ One account maintains that British ministers were not aware of the decision to alert Britain's Strategic Missile Force.⁵⁴ According to Lord Zuckerman, within the Ministry of Defence no orders were given to change Bomber Command's alert state.⁵⁵ Furthermore, senior civilian officials (including the prime minister) 'were not fully cognizant' of events and 'Air Marshal Cross's actions are another example of how the military commander's interests in combat readiness can cut against civilian authorities' interests in safety'.⁵⁶

Other accounts assert that the Ministry of Defence and Bomber Command were in continuous communication throughout the crisis. Ian Madelin, former director of the Ministry of Defence's Air Historical Branch, argues that Cross

had already implemented the measures which could be done routinely and covertly. Anything beyond that would be overt and could be construed as provocative and destabilising [...] The steps he was taking were quite appropriate and, in retrospect, one would not say we should have done anything more or different.⁵⁷

Moreover, the declaration of Alert Condition 3 was specifically designed to be authorized by the officer in charge of Bomber Command without recourse to political authority.⁵⁸ Thus, although there is some evidence to suggest that Cross had been badgering the Ministry of Defence, the Air Ministry and Whitehall for the previous five days to be allowed to bring his command to higher alert, there is no indication that such measures were implemented against political wishes.⁵⁹

A second controversy relates to the readiness level of the British V-force, which might have gone beyond the Alert Condition 3 maintained by official sources. Frontline witnesses unanimously recall that the whole V-force, including all available fully combat-ready crews across the command, was brought to five minutes' (or cockpit) readiness for some hours on the afternoon of 27 October 1962. They later reverted to 15 minutes' readiness. Sir John Willis, then a flight lieutenant and later air chief marshal, revealed the mood of the weekend when stating

'[w]e were all accustomed to frequent weapon loading and readiness exercises but this was very different – the real thing'.⁶⁰ RAF Officer Robin Woolven recalled: '[U]nknown for a wider public, UK nuclear deterrent crews had been sitting in their aircraft ready to start engines for what would have been for many their final mission in a nuclear war.'⁶¹ It remains unclear why this occurred or why their planes then returned to their previous readiness levels the same day.⁶²

November 1962, Soviet Union, the Penkovsky false warning

Soviet intelligence officer Colonel Oleg Penkovsky was recruited in 1961 by British and US intelligence as a double agent and provided high-value information on plans and descriptions of Soviet nuclear launch sites in Cuba. However, Penkovsky was under surveillance and was arrested on 22 October 1962. He had been given a code by which to warn his handlers if a Soviet attack on the United States was imminent. He was to call twice, one minute apart, and only blow three short breaths each time. He made the calls to MI6 Head of Station Gervase Cowell, at the UK embassy in Moscow. However, Cowell used his judgment and decided not to inform London and Washington as he should have done. He judged correctly that Penkovsky had been arrested and his codes had been broken, and decided not to act.⁶³ The calls also came to his CIA handler, however. He did act by sending the information on to his superiors, who made further checks that resulted in the capture and subsequent expulsion of a US diplomat from the Soviet Union.⁶⁴

1973, Israel, Arab–Israeli war⁶⁵

Israel's official stance of nuclear opacity can be characterized in the statement that it will 'not be the first to introduce nuclear weapons to the region' and therefore

⁵³ Group Captain Ian Madelin in Curtiss, John, 'Some Additional Comments on Command and Control during the Cuban Missile Crisis', in Miller, Roger (ed.) (1995), *Seeing off the Bear: Anglo-American Air Power Cooperation during the Cold War* (United States Air Force), pp. 223–25.

⁵⁴ Sagan, *The Limits of Safety*, p. 110.

⁵⁵ *Ibid.* Solly Zuckerman had been scientific director of the British Bombing Survey Unit during the Second World War and was at this time chief scientific adviser to the Ministry of Defence.

⁵⁶ *Ibid.*, p. 110.

⁵⁷ Curtiss, 'Some Additional Comments on Command and Control during the Cuban Missile Crisis', p. 225.

⁵⁸ *Ibid.*

⁵⁹ Twigge and Scott, *Planning Armageddon*, p. 4.

⁶⁰ Woolven, 'Reflections on Memory and Archives', p. 121.

⁶¹ *Ibid.*, p. 118.

⁶² *Ibid.*, pp. 125–26.

⁶³ Hennessy, Peter (2010), *The Secret State: Preparing for the Worst 1945–2010* (Penguin), and Phillips, '20 Mishaps that Might Have Started Accidental Nuclear War'.

⁶⁴ Duns, Jeremy (2013), *Dead Drop: the True Story of Oleg Penkovsky and the Cold War's Most Dangerous Operation* (Simon and Schuster).

⁶⁵ See Cohen, Avner (2013), 'When Israel stepped back from the brink', *New York Times*, 3 October, <http://www.nytimes.com/2013/10/04/opinion/when-israel-stepped-back-from-the-brink.html>.

Israel neither confirms nor denies its possession of nuclear weapons. However, it is widely believed that it does possess a nuclear arsenal of at least 80–100 warheads. There are no official records or public evidence about Israel's nuclear command-and-control procedures, but interviews with figures who previously worked on strategic military issues give crucial insights into these procedures and describe some incidents in which nuclear weapons use was discussed at the highest levels of government.

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The first time that Israel considered a 'nuclear demonstration' was on the eve of the 1967 war when it assembled two or three nuclear explosive devices.⁶⁶ To this day not much is known about that episode. In 2001 former Brigadier General Itzhak Yaakov (Yatza) was arrested and ultimately tried for revealing state secrets that presumably involved that episode.⁶⁷ It is widely believed, however, that the nuclear preparations were not made in response to a specific request from the political leadership, i.e., Prime Minister Levi Eshkol, but rather, as Avner Cohen puts it, 'because it would have been inconceivable [to the project's senior managers and their IDF liaison officers] not to do it and the political leadership could not resist it'.⁶⁸ The strategic justification apparently given for that action was that Israel must have a response even in cases of most extreme and unlikely scenarios, such as an attack by Egyptian missiles with chemical weapons. The idea was to create options for a 'nuclear demonstration', not actual use.⁶⁹ Shimon Peres, at the time an opposition leader, proposed in closed circles that Israel should conduct a nuclear test to prevent war and also to allow it to join the nuclear club. However, Peres' idea was never seriously discussed by the Eshkol government.⁷⁰

The second episode when Israel considered nuclear use was during the early days of the 1973 Yom Kippur war.⁷¹ For decades afterwards there had been rumours that Minister of Defence Moshe Dayan asked Prime Minister Golda Meir to consider a nuclear demonstration. Only the recent testimonies from two identifiable and credible Israeli sources, now no longer alive, confirmed those rumours, but without providing full details. According to the late Arnan 'Sini' Azaryahu, an aide to Yisrael Galili (a senior adviser to Meir), some of the Israeli leadership considered nuclear deployments during the 1973 war. Azaryahu relates how Dayan requested that the prime minister authorize the head of the nuclear agency, Shalheveth Freier, to initiate the preparatory steps for creating 'immediate operational options of nuclear demonstration'. According to Azarayhu, Meir refused. Azaryahu was of the opinion that 'Dayan wanted to trivialize the issue [...] [s]ince he raised his proposal at the very end of the meeting as everyone is about to leave [as if] these were only [technical] preparations for the sake of readiness'. He also suggested that Dayan waited until Chief of Staff David 'Dado' Elazar had left the meeting before proposing the nuclear demonstration option, assuming Elazar would have opposed the idea. Following Meir's rejection of the idea, Galili expressed concerns that Dayan might not have reported this to Freier, and instead urged Meir to contact Freier directly and relay the decision.⁷² Despite this testimony, much of the nuclear dimension of the 1973 war remains publicly unknown.

1979–80, United States, NORAD incidents: exercise tape mistaken for reality and faulty computer chip

On 9 November 1979, a missile warning system was inadvertently fed test scenario data concerning a Soviet nuclear attack.⁷³ Only the ability of NORAD (the North American Aerospace Defense Command) to access the US Air Force's Ballistic Missile Early-Warning System PAVE PAWS radar enabled it to confirm that this alert was false and an

⁶⁶ Cohen, Avner (1998), *Israel and the Bomb* (Columbia University Press), pp. 273–76; Cohen, Avner (2010), *The Worst-Kept Secret: Israel's Bargain with the Bomb* (Columbia University Press), pp. 78–79; Avner Cohen (2007), 'Crossing the Nuclear Threshold: The Untold Story of the Nuclear Dimension of the 1967 Arab Israel War', *Arms Control Today*, Vol. 37, No. 5.

⁶⁷ On the 'Yatza Affair', see Cohen, *The Worst-Kept Secret*, pp. 135–36.

⁶⁸ *Ibid.*

⁶⁹ *Ibid.*, p. 78.

⁷⁰ *Ibid.*, p. 79; Peres himself alludes to this episode in a cryptic way in his autobiography (1995), *Battling for Peace: A Memoir* (Weidenfeld & Nicolson).

⁷¹ For a broad account of the nuclear dimension of the 1973 Yom Kippur War see Cohen, *The Worst Kept Secret*, pp. 80–81.

⁷² See, 'Interview with Arnan "Sini" Azaryahu by Avner Cohen', January 2008, History and Public Policy Program Digital Archive, from the personal collection of Avner Cohen, <http://digitalarchive.wilsoncenter.org/document/117848>; and <http://www.youtube.com/watch?v=wfQawh8RKM4>. See also a detailed commentary on this episode by Cohen, Avner (2013), 'How Nuclear Was It? New Testimony on the 1973 Yom Kippur War', *Arms Control Wonk*, <http://lewis.armscontrolwonk.com/archive/6909/israel-nuclear-weapons-and-the-1973-yom-kippur-war>.

⁷³ United States General Accounting Office, 'By the Comptroller General, Report to the Chairman Committee on Government Operations House of Representatives of the United States: NORAD's Missile Warning System: What Went Wrong?', 15 May 1981, p. 13.

exercise tape had been left in the system.⁷⁴ The incident was troubling enough to prompt Senators Gary Hart and Barry Goldwater to write a report to the Senate Committee on Armed Services, titled *Recent False Alerts from the Nation's Missile Attack Warning System*. Following the incident, Soviet Premier Leonid Brezhnev asked President Carter rhetorically in a communiqué, '[w]hat kind of mechanism is it which allows a possibility of such incidents?'⁷⁵ In 1980, NORAD changed its rules and standards regarding the evidence needed to support a launch on warning.

Yet less than a year later early-warning systems again falsely reported a Soviet nuclear strike. At 02:26 on 3 June 1980, National Security Advisor Zbigniew Brzezinski received a telephone call from General William Odom informing him that the Soviet Union had launched 220 missiles at the United States. Upon receiving confirmation of the attack in a subsequent phone call, with the amendment that it was in fact 2,200 missiles that were headed towards the country, Brzezinski prepared to inform President Carter. With only a minute until Brzezinski was to notify the president, Odom telephoned for a third time to inform Brzezinski that no other early-warning systems had detected these Soviet missiles. The false alarm was later determined to have been caused by a faulty computer chip.⁷⁶

September 1983, Soviet Union, Serpukhov-15 (also known as the 'early-warning system incident')

On the night of 25 September 1983, Lieutenant Colonel Stanislav Yevgrafovich Petrov covered the shift of a supervisor at the Serpukhov-15 control centre for the Soviet satellite early-warning system (abbreviated in Russian as SRPN). Shortly after midnight, an alert sounded at Petrov's station. Incoming data reported that the United States had launched five Minuteman intercontinental ballistic missiles (ICBMs) at the Soviet Union. Upon checking the system, Petrov summarized the situation as follows: 'Reports kept coming in: all is correct; the probability factor is two.'⁷⁷ Protocol required Petrov relay information of the attack to his superiors immediately – including senior officers of the

General Staff and Premier Yuri Andropov – as there would only be an eight-to-ten-minute window in which the Soviet Union could retaliate.

What stood out to Petrov as unusual was that the United States had launched only five missiles – far fewer than Soviet strategic doctrine believed was likely as part of a first strike. He also had reservations because the system could not identify the missiles' jet-trails, and therefore could not confirm their presence. He later explained a possible cause of the incident in greater detail:

The satellite can give false reports if it is at a certain location relative to the Earth under specific atmospheric conditions. It can mean that the American territory functions as a mirror, reflecting the sun's beams. This is extremely difficult to calculate, since the satellite is at least 36,000 kilometres distant from the observation post, and it is moving, and so is the Earth, which is not round but slightly pear-shaped. This also has to be taken into consideration.⁷⁸

Petrov ultimately reported the incident as a false alarm to his superiors. It would be a further 15–20 minutes until it would become apparent whether he had made the right decision. As in other cases, there is the possibility that another decision-maker higher up the chain of command could have come to the same conclusion as Petrov did.⁷⁹ The entire incident played out in secret, and it was only many years later that the full details of this incident were made public.⁸⁰

According to the former head of nuclear command and control of the Soviet General Staff, General Valery E. Yarynich, such frequent alarms reflected the unreliability of Soviet early-warning technology, and there are suggestions that false nuclear alarms happened on a frequent basis.⁸¹

November 1983, Soviet Union and United States, Able Archer-83

A NATO military exercise, codenamed Able Archer-83, took place from 7 to 11 November 1983. It featured a run-through of a NATO attack on the Soviet Union using nuclear weapons and centred on a simulated exercise of command and control. Able Archer-83 followed a conventional military exercise codenamed Autumn Forge,

⁷⁴ Krepinevich, Andrew F. (2013), *Critical Mass: Nuclear Proliferation in the Middle East* (Center for Strategic and Budgetary Assessments), p. 18.

⁷⁵ State Department cable 295771 to US Embassy Moscow, 'Brezhnev Message to President on Nuclear False Alarm', 14 November 1979, US State Department FOIA release, p. 2.

⁷⁶ Hoffman, David (2010), 'The Fear Factor', *Foreign Policy*, 8 July, http://www.foreignpolicy.com/articles/2010/07/08/the_fear_factor.

⁷⁷ Stanislav Petrov, interviewed in Vasilyev, Yuri (2004), 'On the Brink', *The Moscow News*, 29 May, http://www.brightstarsound.com/world_hero/the_moscow_news.html.

⁷⁸ Stanislav Petrov, interviewed in Libak, Anna (2004), 'Nuclear War: Minuteman', *Weekendavisen*, 2 April, http://www.brightstarsound.com/world_hero/weekendavisen.html.

⁷⁹ Barrass, Gordon S. (2009), *The Great Cold War: A Journey through the Hall of Mirrors* (Stanford University Press), p. 296.

⁸⁰ Soviet General Staff analyst Vitalii Nikolaevich Tsygichko gave a vivid description of the general state of mind among Soviet leadership and lower-ranking personnel at the time as '[a]mong politicians as well as the military, there were a lot of crazy people who would not consider the consequences of a nuclear strike'. See 'The 1983 War Scare: "The Last Paroxysm" of the Cold War Part I: Soviet "Huffing and Puffing?" "Crying Wolf?" "Rattling Pots and Pans?" or "A Real Worry That We Could Come into Conflict through Miscalculation?"', National Security Archive, <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB426/> [accessed 22/10/13].

⁸¹ Twigg and Scott, *Planning Armageddon*, p. 12.

which contained a scenario wherein the forces of Warsaw Pact states outnumbered those of the United States (19,000) and NATO (40,000). Able Archer-83 was therefore intended to simulate a nuclear attack aimed at stopping a Soviet advance. During the exercise, NATO forces went through all alert phases from DEFCON-4 to DEFCON-1.

Two years earlier, concerns over the threat posed by the imminent stationing of US Pershing II missiles in Europe, along with heightened geopolitical tensions, had provoked a genuine fear among the Soviet leadership of a NATO nuclear first strike.⁸² As a result, they had launched Operation Raketno-Yadernoye Napadenie (more commonly referred to as Operation RYAN⁸³), a large-scale intelligence-collection operation.⁸⁴ It began in 1979 with the objective of anticipating a US/NATO first strike by observing military preparations and identifying the decision to launch.⁸⁵ One such scenario was the possibility that the United States or NATO might conceal plans to launch a decapitating first strike by holding a military exercise, a concern that became particularly salient in Soviet military doctrine.⁸⁶

The Able Archer-83 exercise thus occurred at a time when relations between the Soviet Union and United States had become particularly strained and Soviet intelligence activity was at a particularly high level. President Ronald Reagan had just publicly launched the Strategic Defence Initiative (SDI) and famously labelled the Soviet Union an ‘evil empire’ in March of the same year. Pershing II missiles – by now a major source of Soviet anxiety⁸⁷ – were also scheduled to be deployed in Europe after the conclusion of Able Archer-83 on 23 November. In September, Korean Air Lines Flight 007 was shot down en route to Seoul by a Soviet fighter plane after straying too close to a Soviet missile test site. Among the 269 dead was a US congressman, Lawrence

McDonald, and Reagan later described the incident as an ‘act of barbarism’.⁸⁸ Andropov stated on 29 September that America was on ‘a militarist course that represents a serious threat to peace’, intent on ensuring ‘a dominating position in the world for the United States of America without regard for the interests of other states and peoples’.⁸⁹

The potential for misunderstanding was therefore high by the time Able Archer-83 took place. National Security Advisor Robert McFarlane later claimed that he ‘had serious misgivings about approving the drill as originally planned [...] [t]here were concerns that superpower relations were too tense. There was a concern with how Moscow would perceive such a realistic drill.’⁹⁰ It had been originally planned to include President Reagan in the exercise, but these worries led to his exclusion from the scenario. Operation RYAN had stipulated that participation of key NATO heads of state, as opposed to defence ministers, could indicate that an attack was imminent. But although Reagan was absent from the exercise, other leaders did participate, including the UK prime minister, Margaret Thatcher, and the West German chancellor, Helmut Kohl.⁹¹

Able Archer included at least four potential indicators or ambiguous signals that could possibly have been reported by RYAN and led to misperception. First, the Soviet Union could have been alarmed by a 170-flight radio silent airlift of 19,000 US soldiers to Europe that occurred during Reforger-83, the previous conventional NATO exercise. Second, Soviet intelligence could have detected the shift of NATO commands to the alternative war headquarters that would be used for major military conflict. Third, the Soviet secret service could have detected the practice of ‘new nuclear weapons release procedures’, including consultations with small cells of US Defense Department

⁸² Oberdorfer, Don (1990), ‘Interview with former [redacted] hand, at [the Hotel] Madison. May 22’, Princeton University, Mudd Manuscript Library, Don Oberdorfer Papers 1983, 1990, Series 3, Research Documents Files.

⁸³ Other acronym spellings include RIAN and VRYaN.

⁸⁴ Prior to Able Archer, a document from then KGB Chairman Yuri Andropov dispatched to Leonid Brezhnev confirms that the KGB had implemented measures ‘to strengthen intelligence work in order to prevent a possible sudden outbreak of war by the enemy’. See ‘The 1983 War Scare: “The Last Paroxysm” of the Cold War Part I’.

⁸⁵ Operation RYAN stipulated that Soviet military intelligence should prioritize intelligence-gathering related to three areas: US and NATO policy and strategy towards the Warsaw Pact; the installation of new weapons systems designed to launch a first strike (such as Pershing II); and signals that the United States and NATO were preparing a first strike. Fischer, Benjamin, ‘A Cold War Conundrum: The 1983 Soviet War Scare’, CIA Center for the Study of Intelligence, <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/a-cold-war-conundrum/source.htm#HEADING1-03> [Accessed 07/04/14].

⁸⁶ See Andrew, Christopher and Gordievsky, Oleg (1993), *Comrade Kryuchkov's Instructions: Top Secret Files on KGB Foreign Operations, 1975–1985* (Stanford University Press), p. 72; Pry, Peter Vincent (1999), *War Scare: Russia and America on the Nuclear Brink* (Praeger Publishers), pp. 13–14.

⁸⁷ Prior to the exercise, US bases around the Soviet Union’s perimeter had moved to a higher level of alert. It was unclear to Moscow whether this was done in conjunction with a recent bombing in Beirut or was one of the positive indicators of an approaching nuclear attack. Also, following the US invasion of Grenada on 25 October 1983, the communication exchange between British Prime Minister Margaret Thatcher and Reagan had intensified. Although the Soviet Union had pinpointed an increase in communications traffic, the encrypted contents were not known to it. But according to the Operation RYAN checklist, it precisely coincided with the indication for possible consultations between the US and British leadership before a nuclear attack. In addition, Able Archer had involved more C2 centres than had earlier exercises and its communications had been in a new message format. The transition from the conventional to nuclear phase of the exercise had deviated from common practice.

⁸⁸ Quoted in Fischer, Beth A. (1997), *The Reagan Reversal: Foreign Policy and the End of the Cold War* (University of Missouri Press), p. 113.

⁸⁹ Yuri Andropov, (1983) ‘Statement by General Secretary of the CC of the CPSU, Chairman of the Presidium of the Supreme Soviet of the USSR Yu. V. Andropov’, *Pravda*, 29 September.

⁹⁰ Quoted in Fischer, *The Reagan Reversal*, p. 123.

⁹¹ There is debate as to whether or not Reagan was meant to be included in the exercise. For example, Jonathan DiCiccio writes that ‘For the first time, Able Archer was to include the highest levels of command of the US government, including the President and Vice President.’ DiCiccio, Jonathan M. (2011), ‘Fear Loathing, and Cracks in Reagan’s Mirror Images: Able Archer 83 and an American First Step toward Rapprochement in the Cold War’, *Foreign Policy Analysis*, Vol. 7, No. 3 (July), p. 260.

and UK Ministry of Defence war-gamers. Lastly, there were numerous instances when NATO personnel called B-52 sorties nuclear 'strikes' during communications.⁹² However, another intelligence source, Harry Burke, fought to raise awareness of these risks in a Joint Intelligence Committee (JIC) report, in which he stressed that the Soviet Union might interpret the training exercises as a threat.⁹³

On 5 November, Moscow cabled the KGB London *residentura* with explicit reference to RYAN and called for agents to be vigilant for 'announcements of military alert in units and at bases' and the 'appearance of new channels of communications',⁹⁴ both of which were featured in Able Archer-83. Between 8 and 9 November, Soviet cables stating that an alert had been raised at US bases were sent to the KGB's London *residentura*.⁹⁵ The cables speculated that the United States was either responding to the bombing of a US barracks in Beirut on 23 October or preparing for a nuclear strike. There are also indications that the chief of the Soviet General Staff, Marshall Nikolai Ogarkov, moved to a wartime command bunker on 2 November and ordered some Soviet forces to move to a state of high alert.⁹⁶ Soviet air forces in Eastern Europe increased their state of alert between 8 and 9 November and combat flight operations were suspended from 4 to 10 November. An additional concern was that Andropov was in hospital on a dialysis machine throughout Able Archer.

Oleg Gordievsky – a double agent working for MI6 – was able to inform the United States and NATO allies of these Soviet interpretations and actions, largely owing to his access to the KGB *residentura* in London. A former chief historian of the CIA has commented that 'only Gordievsky's timely warnings to the West kept things from getting out of hand [...] Gordievsky's information was an epiphany for President Reagan, convincing him that the Kremlin indeed was fearful of a US surprise nuclear attack'.⁹⁷

As the exercise reached its conclusion on 11 November, the Soviet Union ceased speculating that the United States and NATO had been mobilizing a nuclear attack. Although

Soviet archives have not released any documents related to the reactions of the Politburo or General Staff, there are indications that the exercise was taken very seriously as a genuine nuclear threat. Reagan reflected in his memoirs that

During my first years in Washington, I think many of us in the administration took it for granted that the Russians, like ourselves, considered it unthinkable that the United States would launch a first strike against them. But the more experience I had with Soviet leaders and other heads of state who knew them, the more I began to realize that many Soviet officials feared us not only as adversaries but as potential aggressors who might hurl nuclear weapons at them in a first strike; because of this [...] they had aimed a huge arsenal of nuclear weapons at us.⁹⁸

Initially, the general assessments of US and British intelligence stressed that the Soviet Union did not feel threatened by US actions. The British Special National Intelligence Estimate (SNIE) in 1984 stressed that '[w]e believe strongly those Soviet actions are not inspired by, and Soviet leaders do not perceive, a genuine danger of imminent conflict or confrontation with the United States'.⁹⁹ The official assessments and intelligence releases of the United States and the United Kingdom, however, might have tried to assuage NATO and European concerns.¹⁰⁰ New archival research has indeed revealed that the State Department requested a 'sanitized version' of the 1984 SNIE to be shared with NATO allies.¹⁰¹ Intelligence staff in the UK Ministry of Defence later stated that 'the Russians appear to have reacted in an unprecedented way to the NATO exercise Able Archer 83'.¹⁰²

Some sources from the Soviet side, however, contend that the leadership never concluded an attack was imminent, although this remains a point of contention.¹⁰³ According to General Andrian Danilevich, a long-serving General Staff officer, 'in 1983, there was never a "war scare" in the headquarters of the General Staff', where he was working at this time. 'No one', Danilevich said, 'believed there was an immediate threat of a nuclear strike from the United States or NATO'.¹⁰⁴ One suggested explanation for

⁹² Jones, 'Countdown to Declassification', p. 50.

⁹³ On the other hand, Peter Pry argues that it is 'inconceivable' that the exercise would have continued had Western authorities had clear evidence that its continuation might provoke a Soviet nuclear strike. Pry, *War Scare*, p. 42.

⁹⁴ 'The 1983 War Scare: "The Last Paroxysm" of the Cold War Part II: "Blue's use of nuclear weapons did not stop Orange's aggression"', National Security Archive, <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB427/> [accessed 22/10/13].

⁹⁵ Soviet intelligence had been incorrect, as no bases were on high alert.

⁹⁶ Scott, Len (2011), 'Intelligence and the Risk of Nuclear War: Able Archer-83 Revisited', *Intelligence and National Security*, Vol. 26, No. 6, p. 768.

⁹⁷ Fischer, 'A Cold War Conundrum'.

⁹⁸ Reagan, Ronald (1990), *An American Life*, pp. 588–89.

⁹⁹ Special National Intelligence Estimate (1984), 'Implications of recent Soviet military-political activities', 10 November, p. iii.

¹⁰⁰ See, for example: Jones, 'Countdown to Declassification'. As Nate Jones has highlighted (p. 55), 'US policy makers [...] did not want to tell their NATO allies that Able Archer 83 may have increased the risk of nuclear war, because doing so might have caused some of those allies to reconsider decisions to deploy nuclear-armed US cruise and Pershing II missiles on their territory.'

¹⁰¹ *Ibid.*, p. 49.

¹⁰² Intelligence Staff (1984), 'Soviet Union: Concern About a Surprise NATO Attack', UK Ministry of Defence, 8 May, p. 3, <http://nsarchive.files.wordpress.com/2013/11/document-9.pdf>.

¹⁰³ Twigge and Scott, *Planning Armageddon*, p. 8.

¹⁰⁴ Adamsky, Dima (2013), 'The 1983 Crisis: Lessons for Deterrence Theory and Practice', *Journal of Strategic Studies*, Vol. 36, No. 1, p. 25.

this is that the Soviet intelligence services intentionally withheld information, knowing it could be interpreted as an imminent nuclear threat by Moscow.¹⁰⁵

1991, Soviet Union, failed coup

From 18 to 21 August 1991, an attempted coup in the Soviet Union resulted in President Mikhail Gorbachev losing control of his nuclear briefcase for three days after it was confiscated by Minister of Defence Dmitry Yazov, one of the coup leaders. According to Soviet command and control at the time, if the primary system, belonging to the president, was rendered incommunicado for an extended period, then primary authorization was delegated to one of the remaining two cases.¹⁰⁶ The two other nuclear briefcases were in the possession of leaders of the coup.¹⁰⁷

Lieutenant Colonel Vladimir Kirillov, the commander of the nuclear watch who was with President Gorbachev, realized that he was prevented from communicating with the outside world, and crucially with Russian President Boris Yeltsin and US President George H.W. Bush, by the self-proclaimed State Committee for State of Emergency.¹⁰⁸ When Gorbachev picked up the red phone to the strategic nuclear forces, it was silent.¹⁰⁹ Hence, on 19 August there was no communication between the division of General Staff that oversees the nuclear system and the nuclear suitcase duty officers, in effect cutting off the Soviet nuclear forces from their civilian commander.

During this period, Yazov executed Order 8825, which stated that ‘all branches of the USSR Armed Forces on Soviet territory shall move to Increased Combat Readiness’, described by Deputy Prosecutor General Yevgeniy Lisov as a state of ‘readiness for war’. Lisov later suggested that, in hindsight, one cannot eliminate the possibility that nuclear weapons could theoretically have been used during this

phase of Increased Combat Readiness without Gorbachev’s consent ‘had certain forces shown a greater interest in interfering in the situation’.¹¹⁰

Accounts by the military suggest that the nuclear commanders were divided on whether or not to support the coup.¹¹¹ The commanders themselves maintained that there was no danger of losing control of nuclear weapons during this time. David Hoffmann maintains that it is unlikely that the three commanders would have followed orders from the ‘[c]lownish coup plotters’.¹¹² Verly Yarynich recalls that ‘The military understood the danger of rocking the boat in this storm, and did everything to prevent the boat from keeling over.’¹¹³ After the failure of the coup, the nuclear briefcase was handed over the President Yeltsin, and command over Russia’s nuclear forces returned to normal.

1995, Russia, Black Brant scare

On 25 January 1995, scientists in Norway launched a Brant XII rocket from the Andøya Rocket Range, intended to study the aurora borealis over the Svalbard region. The rocket rose 930 miles above earth with a trajectory that would have led to its landing close to Russian territory. The rocket itself was a much larger design than previous versions used by Norway, and it also used the initial stage of a retired US tactical missile, MGR-1 ‘Honest John’, giving it a much higher boost range.¹¹⁴

The Norwegian Foreign Ministry had sent letters on 21 December 1994 to neighbouring states, including Russia, about its intention to launch a Black Brant XII four-stage research rocket between 15 January and 10 February 1995, with the schedule for launch dependent on weather conditions. Although Russian General Staff Chief Mikhail Kolenikov told the press on 25 January that ‘no precise time for the rocket launch was given’,¹¹⁵ the letter itself demonstrates that this information was provided, along

¹⁰⁵ There are multiple competing explanations for that. Some academics suggest that intelligence officers deliberately removed information that would have made the attack more plausible (see Mastny, Vojtech (2009), ‘How Able Was “Able Archer”? Nuclear Trigger and Intelligence in Perspective’, *Journal of Cold War Studies*, Vol. 11, No. 1; Manchanda, Arnav (2009), ‘When Truth is Stranger than Fiction: the Able Archer Incident’, *Cold War History*, Vol. 9, No. 1; Scott, ‘Intelligence and the Risk of Nuclear War’). Others suggest that the fear of a US attack in the Soviet leadership might have led the intelligence community to look for confirmation, i.e. maintaining longer the idea of a risk of attack (see Adamsky, ‘The 1983 Crisis’, p. 27).

¹⁰⁶ Sokov, Nikolai N., ‘Controlling Soviet/Russian Nuclear Weapons in Times of Instability’, in Sokolski, Henry D. Sokolski and Tertrais, Bruno (eds) (2013), *Nuclear Weapons Security Crises: What Does History Teach?* (Strategic Studies Institute Publications Office), p. 100.

¹⁰⁷ Gorbachev claims that he lost control of the suitcase for approximately 73 hours. This does not mean that the members of the coup were in possession of the console for the entire time – Sokov claims they were only from 19 August – nor is it unanimously accepted that they could launch a nuclear first strike. However, it is clear that they could have authorized a retaliatory strike in case of an attack and the entire Soviet arsenal was put on high alert during that period. See Sokov, ‘Controlling Soviet/Russian Nuclear Weapons in Times of Instability’, p. 100.

¹⁰⁸ *Ibid.*, p. 99.

¹⁰⁹ *Ibid.*, pp. 370–71.

¹¹⁰ Quoted in Pry, *War Scare*, pp. 73–74.

¹¹¹ Hoffmann, *The Dead Hand*, p. 374.

¹¹² *Ibid.*, p. 374.

¹¹³ *Ibid.*, pp. 374–75.

¹¹⁴ Sokov, Nikolai N. (1997), ‘Could Norway Trigger a Nuclear War? Notes on the Russian Command and Control System’, *PONARS Policy Memo* 24, October, Centre for Nonproliferation Studies, Monterey Institute, p. 1.

¹¹⁵ Quoted in Pry, *War Scare*, p. 236.

with coordinates for the launch site and the rocket's predicted landing zone.¹¹⁶ A more likely explanation for the subsequent events is that the communiqué was lost and thus not relayed to radar operators at the Olenegorsk early-warning station.¹¹⁷

With a radar signature strikingly similar to that of a Trident II submarine-launched ballistic missile (SLBM), Russia's missile warning system, SRPN, quickly identified the rocket as a nuclear-tipped ballistic missile. The former commander of Russian Radar Forces, General Anatoly Sokolov, later said that 'the start of a civilian missile and a nuclear missile, especially at the initial stage of the flight trajectory, look practically the same'.¹¹⁸

At the time, the prospect of a surprise attack was not necessarily discounted. While the trajectory of the rocket could have led to its landing near northern Russia, which would not be the case if this was a strategic strike, there were concerns that it could nevertheless have been an electromagnetic pulse (EMP) attack designed to disable detection systems and precede a more devastating strike. An attack on the Kola peninsula, which housed Russian nuclear submarines, was also not ruled out. President Yeltsin was notified within minutes of the launch and presented with one of three briefcases used to relay the authorization of a nuclear launch.¹¹⁹

Yeltsin deliberated over the phone for several minutes with General Mikhail Kolesnikov, the second possessor of a nuclear briefcase, as they studied the trajectory of the Brant rocket until it was clear that it would land beyond Russian territory in Norway's Spitzbergen region. In this case, technology and early-warning systems functioned properly but it was a case of 'mistaken identity'.¹²⁰

May–June 1999, India and Pakistan, Kargil crisis

The 1999 Kargil crisis, one of the most dangerous incidents involving the near use of nuclear weapons since the end of the Cold War, needs to be considered in the context of other crises in Indo-Pakistani relations. Perhaps most important

among these was Brasstacks, an Indian military exercise that took place in 1986–87 and was the largest in South Asia at the time. While there was no explicit threat of nuclear use (Pakistan was not yet a declared nuclear state) there was an 'indirect nuclear dimension'¹²¹ to the crisis, which not only changed threat perceptions in India and Pakistan, but also prompted the United States to play a more active role in conflict resolution in South Asia. The United States would play a similar role in the future, and therefore Brasstacks also represents an important precedent in external mediation.¹²²

The case of Brasstacks demonstrated miscommunication and misperception on both sides. India, for example, did not fully notify Pakistan of the exercise beforehand.

Operation Brasstacks occurred in four stages in the province of Rajasthan and involved 400,000 Indian troops within 100 miles of the border with Pakistan, which responded with its own exercises, Flying Horse and Sledgehammer. The crisis reached its height in December 1986 following Pakistani troop movements. However, the military leadership spent two weeks debating how to respond before passing on news of the escalation to newly elected Indian Prime Minister Rajiv Gandhi.¹²³ On 18 January 1987, the US ambassador intervened by meeting with the Indian minister of state for defence and securing an agreement to resolve the crisis, a message he subsequently passed to Pakistani officials. Only then did India and Pakistan activate the crisis hotline.

Like Able Archer, the case of Brasstacks demonstrated miscommunication and misperception on both sides. India, for example, did not fully notify Pakistan of the exercise beforehand.¹²⁴ In addition, Pakistan claims that in a meeting of the South Asian Association for Regional Cooperation on 16–17 November, Gandhi agreed that Brasstacks should be reviewed and provided vague assurances. However, the exercise continued as planned and the situation escalated further, possibly because Gandhi knew so little about it.¹²⁵

¹¹⁶ The untitled letter, dated 21 December 1994, can be found at http://russianforces.org/files/Black_Brant_Letter_19941221.pdf.

¹¹⁷ For instance, Senator Pat Roberts alleged in 1998 that 'the letter got lost in the mail. It never made it to President Yeltsin. It never made it to the radar crews in Russia. As a result, within minutes, Russian President Boris Yeltsin was brought a black nuclear command suitcase and for several minutes, wild confusion reigned in Russia, and Russia's command and control system was operating in a combat mode.' 'United States-Russia Relations and the Status and the Direction of the Russian Nuclear Forces and Their Command and Control', *Congressional Record*, Vol. 144, No. 29, 17 March 1998, p. S2099.

¹¹⁸ Interviewed in Hoffman, David (1998), 'Cold-War doctrines refuse to die', *Washington Post*, 15 March, p. A01.

¹¹⁹ Interviewed in Pry, *War Scare*, p. 224.

¹²⁰ Sokov, 'Could Norway Trigger a Nuclear War?', p. 2.

¹²¹ Bajpai, Kanti R., Chari, P.R., Cheema, Pervaiz Iqbal, Cohen, Stephen P. and Ganguly, Sumit (1995), *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (Manohar), p. 3.

¹²² We are grateful to Dr W. P. S. Sidhu for pointing out that there were earlier efforts at outside mediation, notably the role of the World Bank in the Indus Waters Agreement and the role of the Soviet Union in the 1965 Tashkent Agreement following the 1965 India–Pakistan war.

¹²³ Perkovich, George (1999), *India's Nuclear Bomb: The Impact on Global Proliferation* (University of California Press), pp. 279–80.

¹²⁴ Krepon, Michael and Cohn, Nate (eds) (2011), *Crisis in South Asia: Trends and Potential Consequences* (Stimson Center), p. 18.

¹²⁵ *Ibid.*, p. 31.

Leading the operation was Indian Chief of Army Staff General K. Sundarji, and there is reason to believe he intentionally escalated the crisis in the hope of provoking Pakistan into a military confrontation that would allow India to take out Pakistan's burgeoning nuclear weapons programme.¹²⁶ Much of the escalation, therefore, can be attributed to miscommunication within the Indian government, and possibly also the personal ambition of General Sundarji. By December, Gandhi realized the danger of further escalation and provided a full briefing on the exercise to the media in an effort to be more transparent. On the Pakistani side, it was the intelligence service, which, rightly or wrongly, interpreted Brasstacks as a test of will with the potential for confrontation and chose to reciprocate with its own military exercises.¹²⁷ Shortly after the crisis was averted, the nuclear scientist A.Q. Khan acknowledged the existence of Pakistan's nuclear arsenal in an interview. George Perkovich captures the 'near miss' nature of the case, pointing out that

[t]he liabilities of this type of decision making are greater in nuclear policy, where prime ministers and top scientists tend to exclude others from deliberations. This has generally led to cautious policies, but at the exceptional moments when major decisions were made, as in 1974 [...], the lack of analysis and strategy led arguably to negative outcomes.¹²⁸

Against this background, the Kargil crisis arose out of a conventional military conflict between India and Pakistan over the disputed territory of Kashmir. In May 1999, Pakistani troops and pro-Pakistani militants were spotted by Indian intelligence in the Kargil region of Kashmir on the Indian side of the Line of Control (LoC). The Indian Air Force bombed Pakistani bases along the LoC in Kargil. The incident soon escalated into a military confrontation involving the threat to use nuclear weapons.

In the midst of the crisis, Pakistan moved its nuclear weapons from storage. At the end of May, Shamshad Ahmad, Pakistan's foreign secretary, declared that Pakistan would 'not hesitate to use any weapon in its arsenal to protect its territorial integrity', with regard to the disputed Kashmir territory.¹²⁹ India, in its subsequent report on Kargil, referred to Pakistan's use of 'veiled nuclear threats' in order to provoke an international response.¹³⁰

Later accounts of the Kargil conflict indicate that Pakistani decision-makers severely miscalculated how India might interpret these incursions into Kashmir. In particular, they assumed that Pakistan's nuclear arsenal, recently demonstrated in a series of tests, would allow it to assert itself more boldly in any conflict with India. Poor intra-government communications on both sides meant that 'India and Pakistan had poor control over signaling during the crisis, significantly increasing the risk of misperception, miscommunication, and escalation'.¹³¹

The conflict ended thanks to the successful mediation of US President Bill Clinton, who was able to persuade Pakistan's prime minister, Nawaz Sharif, to withdraw his forces from the Indian side of the LoC in Kargil. Conflicting reports have emerged regarding just how much Sharif knew of the Kargil incursion relative to the head of the military, General Pervez Musharraf. Bruce Riedel states that Clinton explicitly asked Sharif if he was aware of how 'advanced the threat of nuclear war really was' and whether he knew that Pakistan's military had begun preparing its nuclear arsenal.¹³² Sharif later said that when Clinton informed him of this,

I was taken aback by this revelation because I knew nothing about it. The American President further told me during the meeting that the nuclear warheads have been moved so that these could be used against India. I was asked by Clinton as to why I was unaware of these developments despite being the elected chief executive and the prime minister of the country. It was a very irresponsible thing to do on General Musharraf's part.¹³³

A minister close to Sharif, Chaudhry Nisar Ali Khan, later commented that Pakistan's army 'very consciously only provided [Sharif] an outline of the exercise in which the focus was totally different ... [It] did not involve the armed forces or crossing the [Line of Control]'.¹³⁴ Musharraf, conversely, alleges that Sharif was fully informed about the incursion into Kargil.¹³⁵ Following the Kargil crisis, Sharif referred to the issue of Kashmir as a 'nuclear flashpoint'.¹³⁶

¹²⁶ This point remains disputed. See, for example, *ibid.*, pp. 2–3, and Perkovich, *India's Nuclear Bomb*, p. 198.

¹²⁷ Perkovich, *India's Nuclear Bomb*, p. 278.

¹²⁸ *Ibid.*, p. 282.

¹²⁹ Baruah, Amit (1999), 'Any weapon will be used, threatens Pak', *Hindu*, 1 June.

¹³⁰ 'From Surprise to Reckoning: Kargil Committee Report Executive Summary', 2000, <http://www.fas.org/news/india/2000/25indi1.htm#3>.

¹³¹ Hoyt, Timothy D., 'Kargil: the Nuclear Dimension', in Lavoy, Peter R. (ed.) (2009), *Asymmetric Warfare in South Asia: The Causes and Consequences of the Kargil Conflict* (Cambridge University Press), p. 167.

¹³² Riedel, Bruce (2002), 'American Diplomacy and the 1999 Kargil Summit at Blair House', Center for the Advanced Study of India, p. 11.

¹³³ 'Mush had moved N-warheads during Kargil war', *The Times of India*, 5 July 2006, http://articles.timesofindia.indiatimes.com/2006-07-05/rest-of-world/27816591_1_kargil-war-kargil-issue-nuclear-warheads [accessed 12/02/14].

¹³⁴ Quoted in Malik, V.P. (2006), *Kargil: From Surprise to Victory* (Harper Collins).

¹³⁵ Musharraf, Pervez (2006), *In the Line of Fire: A Memoir* (Simon and Schuster), pp. 95–98.

¹³⁶ 'Pakistani premier addresses nation on Kashmir withdrawal', BBC News, 12 July 1999, <http://news.bbc.co.uk/1/hi/world/monitoring/392828.stm>.

December 2001–October 2002, India and Pakistan

In 2001 and 2002, India and Pakistan went into a renewed cycle of hostility as a result of the unresolved Kashmir conflict and additional provocations. The crisis was triggered by an allegedly Pakistani terrorist attack on the Indian parliament on 13 December 2001.¹³⁷ Following a series of accusations by both sides, India mobilized troops a week later to Kashmir and elsewhere along the frontier, and Pakistan responded in kind. For 10 months, between December 2001 and October 2002, India and Pakistan kept one million soldiers in a state of high readiness.

The first period of antagonism was based on conventional threat scenarios. The crisis reached its peak in May 2002, however, following an attack by gunmen in Jammu, and at this point it took on a nuclear dimension.¹³⁸ From the beginning of the conflict India had rejected the first use of nuclear weapons, but President Pervez Musharraf of Pakistan refused to do the same and stated that the ‘possession of nuclear weapons by any state obviously implies they will be used under some circumstances’.¹³⁹

However, the crisis was a combination of logical decision-making and seemingly irrational behaviour by decision-makers on both sides, most likely owing to misperceptions.¹⁴⁰ India assumed that Pakistan would not resort to nuclear use if it was involved in a limited conventional war, as the United States would intervene early before the crisis escalated to that level. India’s defence minister maintained that Pakistan would eventually refrain from a nuclear strike because a nuclear exchange would ‘destroy’ Pakistan while India would ‘win’ and lose ‘only a part of [its] population’.¹⁴¹ India’s limited conventional campaign throughout the crisis does not appear to have been entirely logical, however, since it did not seek to escalate the conflict. According to Michael Kraig and Sumit Ganguly, ‘[t]he line between pin-prick, cross-border operations against Pakistan-supported terrorist camps and all-out conventional war was increasingly blurred in Indian planning as the [2001–02] crisis progressed from January onwards’.¹⁴²

The conflict was resolved when US Deputy Secretary of State Richard Armitage made public a pledge by Musharraf to move against specific terrorist groups (such as Lashkar-e-Taiba) and seek negotiations with India. Moreover, Secretary of State Colin Powell was involved in military-to-military talks with the Pakistani side to defuse the nuclear dimension of the crisis. ‘All this chatter about nuclear weapons is very interesting, but let’s talk general-to-general,’ Powell on one occasion maintained in a conversation with the Pakistani military leadership. ‘You know and I know that you can’t possibly use nuclear weapons [...] It’s really an existential weapon that has not been used since 1945. So stop scaring everyone.’¹⁴³

Both parties again relied on the US capacity to resolve the crisis and saw its presence in the region as ‘insurance against escalation to war’.¹⁴⁴ But as Mario Carranza has highlighted, ‘[i]n the next crisis, US diplomacy may fail to prevent nuclear first use by Pakistan and/or nuclear retaliation by India’.¹⁴⁵

India maintains civilian control over its nuclear weapons, routinely separates its warheads and missiles, and has an official policy of no first use. Its strategic posture evolved significantly as a result of the 1999 and 2002 incidents. After the 2001–02 crisis, it developed a rapid response conventional posture (dubbed the ‘Cold Start’ doctrine).¹⁴⁶ India’s military doctrine centres on the use of conventional military force in order to gain territory as quickly as possible, which might be used later as potential leverage in demanding concessions from the Pakistani government. India particularly relies on a significant degree of unpredictability in the deployment of eight specialized divisions known as Integrated Battle Groups (IBG) – including infantry and artillery units – in Pakistan’s territory to strike at its military’s cohesion.¹⁴⁷ In response, Pakistan has fielded the nuclear-tipped short-range Nasr missile, thus introducing tactical nuclear weapons into an already charged atmosphere. The 2008 Mumbai terrorist attacks risked nuclear escalation through a possible rapid conventional response by India and a potential nuclear response by Pakistan.

¹³⁷ Carranza, Mario Esteban (2009), *South Asian Security and International Nuclear Order: Creating a Robust Indo-Pakistani Nuclear Arms Control Regime* (Ashgate), p. 87.

¹³⁸ Nayak, Polly and Krepon, Michael (2006), *US Crisis Management in South Asia’s Twin Peaks Crisis*, Stimson Center Report 57, p. 32.

¹³⁹ See, for example: Keys, Laurinda (2002), ‘Pakistan and India point the finger’, *The Moscow Times*, 5 June, <http://www.themoscowtimes.com/news/article/pakistan-and-india-point-the-finger/246059.html> [accessed 12/02/14].

¹⁴⁰ Chari, P.R., ‘Nuclear Restraint, Nuclear Risk Reduction, and the Security-Insecurity Paradox in South Asia’, in Patil, V.T and Jha, N.K. (eds) (2003), *India in a Turbulent World: Perspectives on Foreign and Security Policies* (South Asian Publishers), p. 262.

¹⁴¹ Kapur, S. Paul (2007), *Dangerous Deterrent: Nuclear Weapons Proliferation and Conflict in South Asia* (Stanford University Press), p. 133.

¹⁴² Kraig, Michael R. and Ganguly, Sumit (2005), ‘The 2001–2002 Indo-Pakistan Crisis: Exposing the Limits of Coercive Diplomacy’, *International Security*, Vol. 14, No. 2, p. 318.

¹⁴³ Nayak and Krepon, *US Crisis Management in South Asia’s Twin Peaks Crisis*, p. 32.

¹⁴⁴ Nayak, Polly (2002), ‘Reducing Collateral Damage to Indo-Pakistani Relations from the War on Terrorism’, Brookings Institution Policy Brief Series, <http://www.brookings.edu/research/papers/2002/09/southasia-nayak>.

¹⁴⁵ Carranza, *South Asian Security and International Nuclear Order*, p. 89.

¹⁴⁶ Walter C. Ladwig III, (2007/08), ‘A Cold Start for Hot Wars? The Indian Army’s New Limited War Doctrine’, *International Security*, Vol. 32, No. 3.

¹⁴⁷ *Ibid.*, pp. 165–66.

Following the crises, retired Pakistani Lieutenant-General Khalid Kidwai stated that one of four scenarios that would prompt Pakistan to use its nuclear weapons included a conventional Indian attack in which significant parts of Pakistan's territory had been occupied, violating what he referred to as Pakistan's 'space threshold'.¹⁴⁸ This 'space threshold' is undefined, and as such India, on the basis of its current military doctrine, could unintentionally trigger the use of nuclear weapons through a sudden escalation in military confrontation where it pre-emptively seized significant portions of Pakistan's territory as a response to a terrorist attack or territorial skirmish.¹⁴⁹ A cable from US Ambassador to India Tim Roemer, entitled 'A Mixture of Myth and Reality', expressed doubts that India's conventional force posture would ever be used beyond the purpose of deterrence owing to operational and logistical complications, and referred to this type of military planning as rolling 'the nuclear dice'.¹⁵⁰

Pakistan's nuclear command-and-control structure is officially divided between three authorities. The first is the National Command Authority, which is chaired by the prime minister. The second is the Strategic Plans Division (SPD), a body comprising government and military representatives set up as the result of command-and-control reforms between 1999 and 2001. The third is Strategic Forces Command, comprised of the military.¹⁵¹ The storage status of Pakistan's nuclear weapons during peacetime has not been explicitly clarified, but it is widely believed that the SPD exercises heightened vigilance against the possibility that they could go missing. Reports indicate that Pakistan does separate its warheads from its delivery systems, and that the warheads themselves are separated by 'isolating the fissile "core" or trigger from the weapon and storing it elsewhere'.¹⁵² While Pakistan's nuclear weapons are therefore not susceptible to being used while on a hair-trigger alert, the warhead's components are nevertheless stored at military bases and can be put together at short notice.

The disputed nature of command and control over Pakistan's military raises questions regarding the stability of its nuclear forces in a context where conventional confrontations can potentially escalate without authorization from the civilian leadership.¹⁵³

Recent 'sloppy practice'

August 2007, United States, Minot

On 30 August 2007, six US nuclear-armed cruise missiles were missing for 36 hours. They were mistakenly placed under the wings of a B-52, and were not guarded according to protocol during a subsequent flight from Minot Air Force Base in North Dakota to Barksdale, Louisiana. Had the plane experienced any problem in flight, the crew would not have known to follow the proper emergency procedures with nuclear weapons on board.¹⁵⁴ This demonstrated negligence at multiple levels. First, the original movement plan was changed and this change was not reported in the documents for internal coordination at Minot. Second, when the breakout crew accessed the storage facility, they did not properly verify the status of the weapons in the facility, as required by established procedure, and failed to note that the missiles on one of the pylons still contained nuclear warheads. Although procedure requires three subsequent verifications (by three different groups) of the payload installed in those cruise missiles, this was not followed.¹⁵⁵

After this widely publicized case of sloppy practice,¹⁵⁶ US Secretary of Defense Robert Gates visited Minot to deliver a speech emphasizing the need for responsibility in handling nuclear weapons. In it, he referred explicitly to this incident:

The problems were the result of a long-standing slide in the Service's nuclear stewardship. [...] For your part, you must never take your duties lightly. There is simply no room for error. Yours is the most sensitive mission in the entire U.S. military.¹⁵⁷

¹⁴⁸ Kapisthalam, Kaushik (2005), 'Pakistan leaves arms calling card', *Asia Times*, 10 February, http://www.atimes.com/atimes/South_Asia/GB10Df06.html.

¹⁴⁹ A retired general who served in India's army denied the existence of the doctrine known as Cold Start: '[t]here is nothing called "Cold Start" and as part of our overall strategy, we have a number of contingencies and options, depending on what the aggressor does. In recent years, we've been improving our systems with respect to mobilisation, but our basic military posture is defensive.' See Khan, Azam (2011), 'Understanding India's "cold start" doctrine', *The Express Tribune*, 18 October, <http://tribune.com.pk/story/276661/understanding-indias-cold-start-doctrine/>.

¹⁵⁰ Roemer, Tim (2010), 'Cable: Cold Start – A Mixture of Myth and Reality', 16 February, http://www.wikileaks.org/plusd/cables/10NEWDELHI295_a.html.

¹⁵¹ Kerr, Paul K. and Nikitin, Mary Beth (2013), 'Pakistan's Nuclear Weapons: Proliferation and Security Issues', Congressional Research Service, 19 March, p. 13.

¹⁵² Warrick, Joby (2007), 'Pakistan nuclear security questioned', *Washington Post*, 11 November, http://www.washingtonpost.com/wp-dyn/content/article/2007/11/10/AR2007111001684_2.html?sid=ST2007111001833.

¹⁵³ In a decidedly optimistic chapter about nuclear command and control in Pakistan, Zafar Iqbal Cheema still concludes that, as one of the only, if not the only, strong institutions able to provide stability and control in Pakistan, the military will retain its traditionally dominant influence over many if not most aspects of nuclear weapons strategy and use. See Born, Hans, Gill, Bates and Hänggi, Hainer (eds) (2010), *Governing the Bomb. Civilian Control and Democratic Accountability of Nuclear Weapons* (Oxford University Press), p. 214.

¹⁵⁴ This included jettisoning the cruise missiles if necessary.

¹⁵⁵ The quotes for the account of this particular accident are taken from the unclassified account available in the February 2008 report from the Defense Science Board Permanent Task Force on Nuclear Weapons Surety, *Report on the Unauthorized Movement of Nuclear Weapons*.

¹⁵⁶ Shultz, George P., Perry, William J., Kissinger, Henry A., and Nunn, Sam (2008), 'Towards a nuclear weapon free world', *Wall Street Journal*, 18 January, <http://www.nuclearsecurityproject.org/publications/toward-a-nuclear-free-world>.

¹⁵⁷ 'Gates stresses nuclear responsibility at Minot Air Force Base', *Global Security Newswire*, 2 December 2008, <http://www.nti.org/gsn/article/gates-stresses-nuclear-responsibility-at-minot-air-force-base/>.

This episode reflects the limits of learning, given that similar sloppy practices had already been identified on at least four occasions in the history of the US air force.¹⁵⁸

February 2009, France and United Kingdom, HMS Vanguard/FNS Le Triomphant collision

Given what is currently known about the 2009 *HMS Vanguard*/FNS *Le Triomphant* collision, the case is not necessarily one of sloppy practice, but rather demonstrates the risk posed by current attitudes towards intelligence and transparency on nuclear weapons issues. At no point does it appear nuclear weapons could have been used inadvertently.

During the night of 3–4 February 2009, the United Kingdom's *HMS Vanguard* and France's *FNS Le Triomphant*, two nuclear-powered, ballistic missile-carrying submarines (SSBNs), collided in the Atlantic Ocean. What is known about the incident is the outcome of a UK freedom of information (FOI) request, investigative journalism and statements from government officials. According to the UK government's account of the incident, obtained through the FOI request, 'Two submerged SSBNs, one French and the other UK, were conducting routine national patrols in the Atlantic Ocean. The two submarines came into contact at very low speed. Both submarines remained safe and no injuries occurred.'¹⁵⁹ The statement added that '[a]t no time was nuclear safety compromised and the Strategic Weapon System remained inside tolerable limits at all times.'¹⁶⁰ The French Ministry of Defence initially stated that *Le Triomphant*, equipped with 16 ballistic missiles, 'collided with an immersed object (probably a container)', but later acknowledged that the collision had involved another nuclear-armed submarine.¹⁶¹

On 2 April 2009, Secretary of State for Defence Bob Ainsworth was asked to list all collisions that involved UK nuclear submarines with other vessels, as well as the grounding of UK nuclear submarines since 1979.¹⁶² Though stating that the data on the incidents that might have occurred between 1979 and 1988 were not held centrally, Ainsworth cited 14 other incidents that occurred between 1988 and 2008.¹⁶³ These included nine instances where nuclear submarines

were grounded, one incident when a nuclear submarine (*HMS Tireless*) collided with an iceberg, one collision with a yacht near the coast of Northern Ireland, and two instances when nuclear submarines snagged fishing vessels.¹⁶⁴ He also reported that since January 1987 there had been 213 fires designated 'small scale', such as those resulting from electrical faults, 21 fires designated 'medium scale', requiring 'significant on-board resources' to extinguish, and three fires that occurred when submarines were docked at naval bases.¹⁶⁵

What is perhaps most worrying about this incident is the level of heightened secrecy between NATO allies concerning the precise whereabouts of their nuclear submarines.

The cause of the 2009 collision is yet to be fully explained by either government. The official position of the UK government was stated in 2010 as being to withhold 'all particulars' of the collision 'on grounds of national security'.¹⁶⁶ Yet a comment by French Defence Minister Hervé Morin does offer one possible explanation for the collision: 'We face an extremely simple technological problem, which is that these submarines are not detectable. They make less noise than a shrimp.'¹⁶⁷ What is perhaps most worrying about this incident is the level of heightened secrecy between NATO allies concerning the precise whereabouts of their nuclear submarines. A spokesperson for the French navy, Jérôme Erulin, stated that 'France does not supply any information regarding the position of its nuclear arms or submarines carrying them because France considers its nuclear arsenal the most vital element in its defense capabilities'.¹⁶⁸ The ex-commander of one of the UK's V-class nuclear submarines, Julian Ferguson, has also highlighted the difficulty of anticipating the location of France's submarines at the time, since the country was outside NATO's integrated military command structure:

There is a system for operating areas that are reserved for American, British, Norwegian, Dutch and Canadian communities, and if you want to go into someone's area of influence, you tell them what you are doing. But if you are not in the NATO military structure, you don't have to do that.¹⁶⁹

¹⁵⁸ Schlosser, *Command and Control*, p. 168.

¹⁵⁹ Nuclear Information Service, ICO CASE REFERENCE FS50444068, MOD Ref. D/CIO/3/18/612 (21-12-2011-141621-001), p. A1, <http://nuclearinfo.org/sites/default/files/Submarine%20collision%20FOI%20release%20270213.pdf>.

¹⁶⁰ *Ibid.*, p. A3.

¹⁶¹ 'Nuclear subs collide in Atlantic', BBC News, 16 February 2009, <http://news.bbc.co.uk/1/hi/7892294.stm>.

¹⁶² 'Commons Hansard Written Answers Text for 2 April 2009', Column 1396W, <http://www.publications.parliament.uk/pa/cm200809/cmhansrd/cm090402/text/90402w0024.htm>.

¹⁶³ *Ibid.*

¹⁶⁴ *Ibid.*

¹⁶⁵ *Ibid.*

¹⁶⁶ 'Commons Hansard Written Answers Text for 30 March 2010', Column 870W, <http://www.publications.parliament.uk/pa/cm200910/cmhansrd/cm100330/text/100330w0005.htm#10033061000015>.

¹⁶⁷ 'French and UK may coordinate submarine patrols', *Die Welt*, 17 February 2009, <http://www.welt.de/english-news/article3220555/French-and-UK-may-coordinate-submarine-patrols.html>.

¹⁶⁸ Harrell, Eben (2009), 'Did France's Secrecy Cause a Nuclear-Sub Collision?' *TIME*, 16 February, <http://content.time.com/time/world/article/0,8599,1879777,00.html>.

¹⁶⁹ *Ibid.*

2013, United States, cases of misconduct

In 2013, the US Air Force and Navy dismissed two top-level officers in charge of nuclear weapons and opened investigations for personal misconduct. The first officer, Major General Michael Carey, was responsible for all 450 of the service's ICBMs. Two unnamed officials have suggested that the investigation was related to alcohol use.¹⁷⁰ Possibly even more serious, the US Navy suspended Vice Admiral Tim Giardana, second in charge of the US strategic command, from duty in September, later demoted him from three stars to two stars, and opened an investigation for having used counterfeit chips in a casino near his base.¹⁷¹ This occurred after the 341st Missile Wing at Malmstrom Air Force Base in Montana, overseeing one-third of the US land-based nuclear arsenal, failed a safety and security inspection.¹⁷²

In April 2013, one officer from the 91st Missile Wing at the same air force base in North Dakota was punished for sleeping on the job while having the blast door open behind him. He was one of two missile officers sanctioned in 2013 for such a fault – the other was from Malmstrom base¹⁷³ – and he admitted during questioning by superiors to having committed the same fault on previous occasions without getting caught.¹⁷⁴ Moreover, air force officers told the Associated Press that such violations of the safety procedures had happened more often than in the two documented cases.¹⁷⁵ The rule clearly states that the door has to remain closed if one of the crew is sleeping, which is allowed in the event of 24-hour shifts.¹⁷⁶ At Minot, a member of the maintenance staff entered the silo and caught a deputy crew commander sleeping with the door open, and reported this to superiors. The officer first denied this, and then said her crew commander had encouraged her to lie.¹⁷⁷ In May 2013, Minot Air Force Base received a 'D' for its safety record and 17 officers were removed from their capacity as launching officers.¹⁷⁸ This

was in spite of the 2007 incident and Secretary Gates' 2008 warning. The air force insisted that the safety of the missiles was ultimately not compromised in any of those episodes because other safety and security mechanisms were in place.

China

There has been no reported incident or case of near inadvertent use in China, although questions about command and control played an important role during the 1969 Sino-Soviet crisis. Lin Bao, Mao Zedong's heir apparent, issued an order placing the military on alert, including guidance to the country's nascent nuclear forces. Following the crisis and Lin's death in 1971, Beijing promoted an official account stating that he had acted without proper authority, although many modern analysts doubt he would have done so without Mao's approval.¹⁷⁹

On the basis of the risk lens and the importance of communication and leadership, even though China has a no first use policy, other examples provide a sense of challenges and cause for concern, particularly during a time of crisis.¹⁸⁰ For example, on two occasions the United States attempted to contact China using the hotline established in 1998, and meant to be similar to the US–Soviet/Russia hotline. However, following the 1999 US bombing of the Chinese embassy in Belgrade and in 2001 when a Chinese fighter jet collided with a US spy plane, the United States was unable to get through.¹⁸¹ In 2007, the two countries agreed to establish another military hotline to prevent future miscommunications and promote reciprocal transparency. As Secretary Gates stated, 'We discussed the need to move forward and deepen our military-to-military dialogue, including that on nuclear policy strategy and doctrine. We agreed to enhance military exchanges at all levels.'¹⁸²

¹⁷⁰ Stewart, Phil and Alexander, David (2013), 'U.S. Air Force fires general overseeing nuclear missiles', Reuters, 11 October, <http://www.reuters.com/article/2013/10/11/us-usa-nuclear-idUSBRE99A0KG20131011>. For a more detailed account, see the recently declassified 'Report of Investigation (S8011P)' (October 2013), <http://www.foia.af.mil/shared/media/document/AFD-131219-045.pdf>, in particular p. 9.

¹⁷¹ 'Navy Vice-Adm Timothy Giardana demoted in gambling probe', BBC News, 9 October 2013, <http://www.bbc.co.uk/news/world-us-canada-24470259>; Martinez, Luis (2013), 'Vice Adm. Tim Giardana Fired as No. 2 Nuclear Commander', ABC News, 9 October, <http://abcnews.go.com/Politics/vice-adm-tim-giardana-fired-nuclear-commander/story?id=20524735>.

¹⁷² 'Navy Vice-Adm Timothy Giardana demoted in gambling probe', BBC News, 9 October 2013, <http://www.bbc.co.uk/news/world-us-canada-24470259>; 'Eric Schlosser on US nuclear weapons'.

¹⁷³ 'US officers left blast door open at nuclear missile posts', Agence FrancePresse, 22 October 2013, <http://www.defensenews.com/article/20131022/DEFREG02/310220037/>.

¹⁷⁴ Burns, Robert (2013), 'Nuke officers left blast door open', Associated Press, 22 October, <http://bigstory.ap.org/article/ap-exclusive-nuke-officers-left-blast-door-open>.

¹⁷⁵ Ibid.

¹⁷⁶ Ibid.

¹⁷⁷ Reported by Lt Colonel John Sheets, spokesman for the Air Force Global Strike Command, quoted in Burns, 'Nuke officers left blast door open'.

¹⁷⁸ Rushe, Dominic and agencies (2013), 'US air force strips 17 officers of power to launch nuclear missiles', *The Guardian*, 8 May, <http://www.theguardian.com/world/2013/may/08/us-airforce-nuclear-missiles>.

¹⁷⁹ Lewis, John and Xue Litain (2008), *Imagined Enemies* (Stanford University Press).

¹⁸⁰ See forthcoming *Adelphi Paper* by Jeffrey Lewis on the topic of Chinese command and control.

¹⁸¹ Goldstein, Avery (2013), 'China's Real and Present Danger', *Foreign Affairs*, September/October Vol. 92, No. 5.

¹⁸² Cody, Edward (2007), 'China and US to establish military hotline', *Washington Post*, 6 November, <http://www.washingtonpost.com/wp-dyn/content/article/2007/11/05/AR2007110500102.html>.

North Korea

Of all nuclear possessor states, the least is known about North Korea's command and control, and history of nuclear incidents. It is thought to possess enough fissile material for approximately eight nuclear weapons¹⁸³ and to have a highly centralized command-and-control system. Much of the information about North Korea's nuclear programme is speculation, but what information there is provides some insight into the risks of nuclear incidents. Nuclear weapons are formally under the control of the National Defence Commission, headed by Supreme Leader Kim Jong-un, but there may be other groups, particularly the military, with influence on nuclear weapons command. Were Kim to order the launching of nuclear weapons, it would take one to two days to arm the weapons, which suggests North

Korea has 'followed China's example' by storing bombs and missiles separately, and that it lacks sophisticated safety devices.¹⁸⁴ The safety and security of this system are much debated: some experts suggest that the highly centralized nature of the regime is favourable for nuclear security and avoiding a nuclear launch, whereas others suggest Kim 'cannot wield nuclear weapons unilaterally' and would be subject to pressure from the military in particular.¹⁸⁵ A recent study offers recommendations based on what is known and calls for

all countries in Northeast Asia [to] work hard at maintaining a stable security environment that avoids the dangers of a crisis while encouraging North Korea to adopt a nuclear strategy that retains its 'no first use' pledge, a strong command and control system, and a stable nuclear weapons posture.¹⁸⁶

¹⁸³ Arms Control Association (2013), 'Nuclear Weapons: Who Has What at a Glance', <http://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat>.

¹⁸⁴ International Crisis Group (2009), 'North Korea's Nuclear and Missile Programs', *Asia Report* No. 168, 18 June, p. 13.

¹⁸⁵ Grossman, Elaine (2011), 'Who Has North Korea's "Nuclear Football?" Few Have an Answer,' *Global Security Newswire*, 20 December.

¹⁸⁶ Roehrig, Terence (2013), 'North Korea's Nuclear Weapons: Future Strategy and Doctrine', Belfer Center Policy Brief, May, http://belfercenter.ksg.harvard.edu/publication/23074/north_koreas_nuclear_weapons.html.

4. Findings

Analysis of these cases reveals repeated themes relating to why nuclear weapons were not used, as well as helping to identify factors that increased the risk of inadvertent use. These observations are applicable to contemporary nuclear policy and will be explored further in the final chapter, which offers policy recommendations. Despite the lack of details on many of the cases described (and with the possibility that additional cases may yet come to light), it can be said with certainty that there was a higher than expected probability of nuclear use owing to accident, error or misjudgment. The risks associated with nuclear weapons remain, the consequences being catastrophic. While on some occasions prudent judgment saved the day, in others errors of judgment nearly led to an extremely costly miscalculation. The findings of this study also highlight the importance of adequate decision-making time in avoiding nuclear use. Additional findings include, at the international level, the importance of context and outside mediation; at the national level, effectiveness in government communications, and involvement of key decision-makers; the limits of learning, particularly given the lack of information on these cases; and, at the individual level, the decisive role of individuals in following intuition and prudent decision-making, often in violation of protocol.

Influence of political context

The majority of cases explored here occurred at a time of heightened political tensions. These were due to a variety of sometimes overlapping factors, including ongoing conflicts that had escalated to near nuclear use, a crisis, and/or military exercises. During such times, communication is often sparse and decision-makers are under extreme pressure. Many of these cases demonstrate the importance of buying time for decision-making, and the immense feeling of anxiety decision-makers experience. Stanislav Petrov's account provides an insight into the moments after the alarms went off at the Serpukhov-15 centre in 1983, where he and other personnel were in a 'state of shock'.¹⁸⁷ US Senator Charles Percy, who was present at NORAD headquarters at the time of the 1979 incident, later stated:

At the time we had that false alarm – that must have been a six-minute period, because it seemed like hours to us – panic broke out. It was a very frightening and disconcerting thing. You wonder what recommendation they would have made at the end of those minutes, until they discovered that it was just an electronic problem.¹⁸⁸

In the context of long-standing political tensions and the risk of crisis escalation, the two cases of Indo-Pakistani conflicts and the Arab–Israeli war demonstrate the ongoing risk in cases of unresolved conflicts. A similar situation could occur on the Korean peninsula, particularly given that North Korea has on occasion cut off its military hotlines to South Korea.¹⁸⁹ It is a reasonable assumption that an exercise similar to Able Archer-83, which simulated command and control, in the region could be confused with an actual attack and provoke a nuclear response. The three incidents during the Cuban missile crisis, along with the Penkovsky case, which occurred immediately afterwards, demonstrate the increased risk during such times of extremely heightened tension. The failed coup in the Soviet Union, while not an international crisis, had potentially serious implications for nuclear decision-making.

The cases here also suggest that military exercises – when conducted at a time of heightened tension or in regions prone to conflict – can increase risk, sometimes dramatically. While ex-officials and historians dispute how close to a nuclear exchange the Able Archer-83 exercise brought the two superpowers, the incident highlights the likelihood of miscommunication during a period of heightened political tensions. In this case, the decision to carry out a NATO military exercise that simulated a coordinated nuclear attack on Warsaw Pact states without informing Soviet authorities led to the assumption that the latter would not confuse the exercise with a real attack. Operation Brasstacks also suggests that exercises entailing very realistic simulations are a potential source of risk when communication between countries is poor.

Hotlines only work if both sides trust the person on the other end to have an interest in resolving the crisis and to take the agreed measures to reduce tensions.

During all such times, a reliable flow of information is essential. Indeed, the cases demonstrate numerous instances when the failure to communicate a key piece of information, such as details about a missile test, increased the risk of escalation and nuclear use. These include Operation Anadyr, in which the United States informed the Soviet Union of its plans to use PDCs, but this was not communicated to Soviet submarines; miscommunication over Able Archer; and the lost cable in the case of Black Brant.

¹⁸⁷ Interviewed in Hoffman, David (1999), 'I had a funny feeling in my gut', *Washington Post*, 10 February, p. A19.

¹⁸⁸ Hearings before the Committee on Foreign Relations, 'Nuclear Arms Reduction Proposals', US Senate, 97th Congress, Second Session, April–May 1982 (Government Printing Office).

¹⁸⁹ Sang-Hun, Choe (2013), 'North Korea cuts off the remaining military hot lines with South Korea', *New York Times*, 27 March, http://www.nytimes.com/2013/03/28/world/asia/north-korea-shuts-last-remaining-hotline-to-south.html?_r=0.

The success of hotlines is often dependent on the geopolitical context.¹⁹⁰ They only work if both sides trust the person on the other end to have an interest in resolving the crisis and to take the agreed measures to reduce tensions. Clearly, hotlines also only work if someone picks up the phone to call, and someone else is there to answer, but the evidence suggests this is not always the case in times of crisis.¹⁹¹ The case of the Soviet coup, when Gorbachev did not have access to the hotline, along with the recent examples from US–Chinese communications, demonstrate that a hotline cannot be readily relied upon to resolve communication problems and prevent inadvertent escalation, or worse.

Outside mediation

Particularly during times of crisis, when risks are high and miscommunication and misperceptions are rampant, the involvement of an external mediator can reduce tensions and prevent further escalation. India's and Pakistan's past success in resolving crises has been due in part to external intervention, which prevented conventional conflicts from escalating. For example, Bruce Riedel, an adviser to President Bill Clinton at the time of the Kargil incident, implied that Prime Minister Sharif was under considerable pressure to reach a solution which would allow Pakistan to save face. Sharif feared that otherwise 'fundamentalists would move against him and this meeting would be his last with Clinton'.¹⁹² Furthermore, Sharif's denial that he gave the order to prepare Pakistan's missile forces raised concerns about the nature of military and civilian control at the time of the Kargil conflict.¹⁹³ It seems that India and Pakistan rely heavily on the diplomatic mediation of third-party states in avoiding further escalation.

Limits of learning

Lieutenant General James Kowalski, the officer in command of all US Air Force nuclear weapons, said in July 2013 that 'the greatest risk to my force is an accident. The greatest risk to my force is doing something stupid'.¹⁹⁴ Commenting on this after six years spent investigating the American nuclear weapons complex, Eric Schlosser noted that '[i]t looks like

there's poor morale and poor leadership in the air force units responsible for nuclear weapons. People are getting sloppy'.¹⁹⁵

This suggests the limits of learning about those issues. There are multiple, well-established reasons for those limits. At the institutional level, the nuclear weapons establishment commonly frames safety in terms of culture and, as a consequence, puts the blame and responsibility on individuals.¹⁹⁶ This prevents institutional learning about structural deficiencies. In addition, time alone will not necessarily lead to a greater awareness of sloppy practices as transparency is competing with memory, and processes of declassification are not linear. Cognitive psychology shows that the mind reaches conclusions based on known knowns, rarely considers known unknowns, and is by definition oblivious to unknown unknowns. That leads to overconfidence and cases of near misses are forgotten as non-events.¹⁹⁷

Systemic accidents result from the complexity of nuclear weapons systems and are often unique and difficult to predict. These incidents will not be identical, which leads to the impression that there is nothing to be learned from them except our inability to anticipate them. Charles Perrow calls these accidents 'normal accidents'.¹⁹⁸ Accidents caused by the limitations of reliability testing can happen more than once. Reliability testing can encourage innovation as a consequence of learning, but also presents epistemic accidents as another source of unknown and points to another limit of learning. John Downer summarizes those two types of accidents, normal and epistemic, in the following terms:

If normal accidents are an emergent property of the structure of systems, then epistemic accidents are an emergent property, a fundamental consequence, of the structure of engineering knowledge. They can be defined as *those accidents that occur because a scientific or technological assumption proves to be erroneous, even though there were reasonable and logical reasons to hold that assumption before (although not after) the event [emphasis in the original]*.¹⁹⁹

Learning relies on both information and experience. As demonstrated by these cases, there is a limit to the amount of information available and therefore nuclear

¹⁹⁰ For a further discussion on the limited utility of hotlines, see Krepon and Cohn, *Crises in South Africa*, p. 18.

¹⁹¹ For an argument showing that the hotline between Washington and Moscow was never used in times of crisis, see Le Guelte, Georges (2009), *Les armes nucléaires. Mythes et réalités [Nuclear Weapons. Myths and Realities]* (Actes Sud), pp. 139, 186, 197, 228–30, 285, 286.

¹⁹² Riedel, Bruce, 'The 1999 Blair House Summit', in Lavoy, Peter R. (ed.) (2009), *Asymmetric Warfare in South Asia: The Causes and Consequences of the Kargil Conflict* (Cambridge University Press), p. 139.

¹⁹³ *Ibid.*, p. 140.

¹⁹⁴ Kowalski, Lt General James (2013), 'Congressional Breakfast Seminar', Washington DC, 31 July, <http://www.afgsc.af.mil/shared/media/document/AFD-130809-096.pdf>, pp. 14–15. As of October 2013, General Kowalski was promoted to Deputy Director of the US Strategic Command.

¹⁹⁵ 'Eric Schlosser on US nuclear weapons'.

¹⁹⁶ Silbey, Susan, (2009), 'Taming Prometheus. Talk about Safety and Culture', *Annual Review of Sociology*, Vol. 35, p. 362.

¹⁹⁷ Kahneman, *Thinking Fast and Slow*.

¹⁹⁸ Perrow, Charles (1999), *Normal Accidents. Living with High Risk Technology* (Princeton University Press).

¹⁹⁹ Downer, John (2011), "'737-Cabriole": The Limits of Knowledge and the Sociology of Inevitable Failure', *American Journal of Sociology*, Vol. 117, No. 3, November, p. 752.

education is constrained to the confines of classification and cannot always learn from the mistakes of the past. This is not to say that all information should be readily available to the public, which could present a security risk, but rather that greater detail, shared research, scholarship and declassification would contribute to developing a more thorough understanding of these incidents so that lessons learned can be applied to future policies.

Involvement of key decision-makers

Decisions about nuclear use in many of these cases came down to only a handful of people. Logic suggests that decision-making structures are better informed and more stable when there are more people involved. While in some scenarios this can lead to indecision, in the case of nuclear weapons this can be regarded as a benefit in that it buys time. In that sense, many of the cases demonstrate the risks of excluding key decision-makers. A conflicting finding also emerged, however, in that the decision *not* to act and relay information, such as in the case of Petrov, can be equally vital in reducing risk. This relates to the importance of intuition, which is discussed below in greater detail.

In at least two instances of near inadvertent nuclear use, namely NORAD in 1979 and Serpukhov-15, the leaders of both the United States and the Soviet Union were kept unaware of the incident, which could have led to an increased risk of nuclear weapons use. In the NORAD case, Brzezinski's delay in reporting the confirmation of a Soviet attack to President Carter by one minute may have proved crucial in preventing the situation from escalating. Referring to the NORAD incident, Brezhnev stated in a letter to Carter that

[a]ccording to reports the incident was reported neither to you nor the secretary of defence, nor to any other responsible officials. This only exacerbates the situation. It turns out that the world can find itself on the brink of a precipice without the knowledge of the President or of other US leaders.²⁰⁰

Petrov's decision not to report the incident as a false alarm in 1983 ran against protocol, which called for supervisors to inform the Soviet General Staff as soon as such an alert occurred. This was premised on the assumption that informing senior leaders of a US attack would have set in motion a nuclear retaliation.

In the case of Able Archer, there is evidence that Rainer Rupp, a top secret agent of the East German Stasi, provided information on 9 November that the operation was not a covert nuclear strike plan.²⁰¹ There is no available evidence of any follow-up from Moscow to Rupp's telegram of 9 November, nor is there evidence that the large number of Stasi agents in West Germany were mobilized to detect and monitor Western preparations for war.²⁰² It appears that the 'unknown Soviet intelligence analysts' in the KGB who received these warnings did not pass them on to the Politburo or senior officials in the Defence Ministry that war might have been imminent, through either 'common sense or incompetence'.²⁰³

Prudent judgment and intuition can save the day

As mentioned previously, some sloppy practices have had positive consequences. For example, Petrov's decision to report the detected launches as false alarms can be seen as negligent, given his acknowledgment that he was not certain they were indeed false. However, this decision made sure that no nuclear launch caused by a misperception could be authorized.²⁰⁴ A significant factor in avoiding an unnecessary nuclear exchange, therefore, was Petrov's background as a scientist, and his ability to analyse the data in a way that would have been beyond the education or training of regular operators. 'I had a funny feeling in my gut [...] I didn't want to make a mistake. I made a decision, and that was it,' Petrov said later in an interview.²⁰⁵

As this case demonstrates, individual decision-making, informed as it is by judgment, expertise and intuition, can avert nuclear crises. Other cases include Maultsby's performance on 'Black Saturday' in recognizing that he had strayed into Soviet air space and his ability to navigate out of it; Gervase Cowell's correct impression that Penkovsky's call was a fraud; and the roles of Harry Burke and Oleg Gordievsky in flagging the potential risks of Able Archer.

The role of individual decision-making is particularly important in cases of technological failures, incomplete information or the misinterpretation of data. For example, in the Black Brant case, the radar equipment used to mistakenly identify the rocket launch as a Trident missile had not been subject to errors or malfunctioning. It was rather the interpretation of the radar readings and the similarities between the shape and trajectory of the Black

²⁰⁰ State Department Cable 295771 to US Embassy Moscow, 'Subject: Brezhnev Message to President on Nuclear Attack False Alarm', 14 November 1979, State Department Freedom of Information Act release.

²⁰¹ Scott, 'Intelligence and the Risk of Nuclear War', p. 13.

²⁰² *Ibid.*, pp. 9–10.

²⁰³ Mastny, 'How Able Was "Able Archer"?', p. 119.

²⁰⁴ Aksenov, Pavel (2013), 'Stanislav Petrov: the man who may have saved the World', BBC News, 13 September, <http://www.bbc.co.uk/news/world-europe-24280831>.

²⁰⁵ Quoted in Hoffman, 'I Had A Funny Feeling in My Gut', p. A19.

Brant rocket that led radar operators to conclude that it was a Trident missile in spite of early-warning systems.²⁰⁶ Yet the Serpukhok-15 incident indicates that, while protocol demands that technicians and early-warning system operators inform their political and military superiors of any early warning of a nuclear launch, this tendency to view a chain of command as an inherent safeguard against inadvertent use ignores the subjective, and sometimes erroneous, nature of the data at hand, as well as the systemic and political pressure upon analysts to assume that the data are authentic.

In the case of Able Archer, there was ‘a rather stunning array of indicators of an increasing aggressiveness in Soviet policy and activities’.²⁰⁷ On 2 November, the chief of the Soviet General Staff, Marshal Ogarkov, moved to his wartime command bunker underneath Moscow, from where he ordered heightened alert of some Soviet forces.²⁰⁸ Moreover, throughout Able Archer, some Soviet UR-100N (SS-19) ICBMs went to a state of combat readiness. Soviet SSBNs moved under the cover of the ice caps to avoid detection. Finally, 75 Pioneer/SS-20 mobile IRBMs were dispersed to pre-selected launch sites around Eastern Europe. Yet it remains unclear how these Soviet movements were related to Autumn Forge and Able Archer or whether they were just regularly scheduled exercises. General Ivan Yesin recalls that ‘we knew that NATO were doing an exercise, not really preparing for the nuclear blow, although of course we couldn’t fully eliminate the possibility that the nuclear strike might have been delivered’.²⁰⁹

If good judgment is understood as trained judgment, it is not good judgment that prevented nuclear use. Rather, it is prudent judgment, which might include disobeying previous orders. It is not sheer intuition or any sort of raw gut feeling either. Prudent judgment implies recognition of the unknown at the time of the decision, and a practical form of wisdom that is built on a sense of what is possible.²¹⁰

Policy implications and recommendations

Even if the probabilities of the use of nuclear weapons – deliberate or inadvertent – are judged to be low, the potential consequences are so high that the associated risks will remain high – ‘too close for comfort’. Nuclear weapons require constant vigilance and caution. Since there are limits to technology being able to prevent nuclear weapons accidents and inadvertent use, Professor Scott Sagan argues that

the U.S. defense department should be telling new nuclear states, loudly and often, that there are inherent limits to nuclear weapons safety. [...] however, the U.S. defense department will not do this, because this would require acknowledging to others, and itself, how dangerous our own nuclear history has been. The important and difficult task of persuasion will therefore fall largely upon individuals outside the organizations that have managed U.S. nuclear weapons.²¹¹

The five NPT nuclear weapon states have been meeting regularly to discuss ways forward on nuclear disarmament and non-proliferation. The discussions have tackled issues of transparency, definitions, verification and accountability. Other more informal meetings have taken place among the wider P5 Plus group (the five permanent members of the UN Security Council plus India and Pakistan). If these meetings continue, they could address issues of risk reduction, training in decision-making and judgment, and prevention of complacency and sloppy practice.

The terrible consequences of the use of nuclear weapons and the doctrines and postures that govern them have been discussed in the First Committee of the UN General Assembly, in the NPT conferences and committees and, more recently, in the series of international meetings on the humanitarian impact of nuclear weapons that began in Oslo in 2013 and in the Open-Ended Working Group on Nuclear Disarmament in Geneva.

The risks do not belong solely to the nuclear weapon states and other possessors. The use of nuclear weapons would affect a great many more people in a large number of countries for a long time. In addition to the direct targets who would suffer the immediate and overwhelming consequences of the blast, heat and prompt radiation, other victims further away could be subject to secondary fallout radiation. There would be a large number of burned, blasted, sick and dying refugees. Depending on the number of explosions and their locations, possible changes to the climate may also reduce crop production for years, leading to increased vulnerability to starvation, particularly in already struggling areas.

The risks of nuclear weapons are thus a problem for all.²¹² Issues pertaining to military doctrines and postures, deployment, and safe and secure practice need to be understood and discussed by all. Leaving the discussion of nuclear weapons doctrines to a small elite group of weapons possessors is unlikely to provide the full range of solutions needed.

²⁰⁶ Petrov confirms this assessment in highlighting that ‘the computer is, by definition, brainless. There are lots of things it can mistake for a missile launch’. Interviewed in Vasilyev, ‘On the Brink’.

²⁰⁷ ‘US/Soviet tension’, Memorandum, 19 June 1984, CIA Mandatory Declassification Review (MDR) release, <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB428/>.

²⁰⁸ Barrass, *Great Cold War*, p. 300.

²⁰⁹ *Ibid.*, pp. 300, 439, n.12.

²¹⁰ This latter aspect is developed in particular in Niccolò Machiavelli’s and Francesco Guicciardini’s understanding of the notion of prudence.

²¹¹ Sagan, Scott, ‘More will be Worse’, in Sagan, Scott and Waltz, Kenneth N. (1995), *The Spread of Nuclear Weapons: A Debate* (W.W. Norton), p. 91.

²¹² See Pelopidas, ‘Avoir la bombe’, and *Global Nuclear Vulnerability* (forthcoming).

Historically, the nuclear discourse has centred on bringing about the elimination of nuclear weapons as a permanent solution to the problem. All states seem agreed on the desirability of achieving and maintaining a world without nuclear weapons. However, progress has been slow, the number of nuclear weapons possessors has risen and the risks of use remain. Pending the achievement of a world without nuclear weapons, there are practical steps that could be taken to reduce the likelihood of inadvertent use. Some options for action are presented below that could have practical effect and reduce humanity's reliance on luck and prudent judgment.

In addition to the practical solutions suggested here, it is also important to acknowledge an underlying issue: the security and political issues behind many of these cases. Many of these contextual factors still exist today or else have been replaced by equally challenging political disputes. These are not likely to be resolved any time soon, and the presence of nuclear weapons increases the risks associated with these conflicts. This report does not mean to suggest a resolution to all these political conflicts, but rather to emphasize the importance of knowing more about cases of near inadvertent use to improve understanding of their causes, and to help mitigate these risks in the future.

Buy time

In cases of near inadvertent use, time afforded decision-makers the opportunity to demonstrate prudent judgment, resolve misperceptions and receive vital pieces of information. Therefore, the response status of nuclear weapons needs to be adjusted to allow more time for decision-making. This could take multiple forms, such as adjusting hair-trigger alerts, retargeting, and reducing force levels and roles for nuclear weapons so that accidents or near inadvertent use are less likely to occur.

The United States and Russia have large numbers of nuclear weapons ready for rapid response. A reduced alert stance could be achieved through a phased approach, with some experts proposing a negotiated agreement.²¹³ One suggestion has been for all nuclear weapons possessors to set default targeting to the closest ocean, as is the case for the United States and Russia since the end of the Cold War, as a confidence-building measure.²¹⁴ Another, faster path would be to develop simultaneous leaders' statements, similar to the 1991–92 Presidential Nuclear Initiatives on tactical nuclear weapons or the 1994 mutual statements on detargeting nuclear weapons. The P5 and the P5 Plus

meetings on nuclear issues could address such approaches, share good practices, and develop guidelines and principles to reduce the alert levels and increase response times.

Nuclear possessor states should develop doctrines stating that nuclear weapons would be used only in response to a nuclear attack, and establish reciprocal protocols to build confidence in 'no first use' policies.

The probabilities of an accident or inadvertent use can be shifted by avoiding situations in which nuclear weapons use would be considered. This has recently been reflected in US nuclear policy, which expressed the desire to reduce reliance on nuclear weapons, but more can still be done.²¹⁵ Additional steps include reducing force levels, even unilaterally, maintaining more weapons in reserve rather than forward deployed, and remaining vigilant in the safety and security of nuclear weapons (discussed below in more detail).

In addition, nuclear possessor states should develop doctrines stating that nuclear weapons would be used only in response to a nuclear attack, and establish reciprocal protocols to build confidence in 'no first use' policies, for example by de-mating warheads from missiles, and communicating 'no first use' policy through nuclear postures and military exercises. The trade-offs in this scenario are between safety and readiness.

Trust- and confidence-building measures

Towards the end of the Cold War, there were regular meetings of military personnel, leaders, politicians and civil society experts to discuss military and nuclear doctrines, and to help chart a way forward through a transition period that was fraught with potential danger and instability. Thanks to the Helsinki Process and the Stockholm Accord, confidence-building measures helped to establish trust between the old enemies. There remains the need for such trust- and confidence-building measures between Russia and the United States, as well as in other parts of the world, such as in the Middle East, South Asia and Northeast Asia. Some of this vital work is already taking place through Track II meetings and the Nuclear Security Summit process, but an increased effort, focusing in particular on the humanitarian impact of the use of nuclear weapons, could be highly effective.

²¹³ Kristensen and McKinzie, *Reducing Alert Rates of Nuclear Weapons*.

²¹⁴ Evidence for this is given in Schlosser, *Command and Control*, p. 478, and Feaver, Peter D. and Sharp, Kristin Thomas, 'The United States', in Born, Gill and Hänggi, *Governing the Bomb*, p. 45.

²¹⁵ US Department of Defense (2010), *Nuclear Posture Review Report*, April, p. v.

Discussion of ‘no first use’ policies and information-sharing on nuclear postures would also contribute to trust, along with buying time for crisis resolution and decision-making.

Refrain from large-scale military exercises during times of heightened tension

Misunderstandings about military exercises increase the risks of miscalculation, escalation and propensity for considering nuclear response. In the case of Able Archer, the NATO states failed to predict how the exercise would be perceived by the Soviet Union, particularly in the tense geopolitical climate of 1983. The Soviet Union also demonstrated misperceptions, however, and a heightened threat perception, as manifested in Operation RYAN and sensitivity to any NATO military operations. Similarly, though not nuclear in nature, Operation Brasstacks demonstrated misunderstanding on the part of India and Pakistan. The evidence from the Black Brant incident and from Operation Anadyr reinforces this point. Thus there needs to be a better awareness of how military exercises will be perceived by a variety of actors and to communicate beforehand and during the exercise.

Involve a wider set of decision-makers

Because of the high levels of secrecy surrounding nuclear weapons issues, the number of people involved with decision-making has been small and drawn from an elite slice of the societies that are involved. A wider group of people – drawn from elected representatives as appropriate – could be brought into the nuclear weapons decision-making processes in their own right. This group of ‘trustees’ or a ‘nuclear jury’ has the potential to be more representative of the society – including more women, for example – and is likely to result in greater cognitive diversity and understanding.

Increase awareness of and training in nuclear weapons effects

In the light of the sloppy practices highlighted above, including safety violations and misconduct,²¹⁶ there is a growing concern that the people now in charge of the maintenance of nuclear weapons may not share the same awareness of the horrific effects of nuclear weapons as their predecessors. The end of nuclear testing and achievement of a Comprehensive Test Ban Treaty is a very welcome step in disarmament and the reduced reliance on nuclear weapons in military doctrines. However, anthropological research has established that the shift from nuclear testing to nuclear testing simulation has removed practitioners from the experience of the effects of nuclear explosions. In Joseph Masco’s words, this ‘blocks access to any visceral understanding of the power of the U.S. nuclear arsenal, replacing it with sophisticated material science questions and a virtual spectacle, which together offer only complexity and aesthetic pleasure’.²¹⁷ The military structures of nuclear weapons possessors have training courses in place to address this issue. Considering their investment in stockpile stewardship programmes, it is hard to imagine that the nuclear weapons possessors have not ensured that the humanitarian impacts of nuclear weapons are a vital form of training for all relevant personnel in the scientific, military and political realms. Yet in the current situation, in which the role of nuclear weapons is unclear to many people and younger generations no longer experience a daily fear of their effects, new thinking may be required. In addition, education in today’s military structures incorporates a great deal of emphasis on individual responsibility and independent thought. Modules for training in good judgment, listening to one’s own intuition and learning from the examples outlined in this report would be worth developing.

²¹⁶ Cooper, Helene (2014), ‘Cheating accusations among officers overseeing nuclear arms’, *New York Times*, 15 January, http://www.nytimes.com/2014/01/16/us/politics/air-force-suspends-34-at-nuclear-sites-over-test-cheating.html?smid=fb-share&_r=0 [accessed 15/01/14].

²¹⁷ Masco, Joseph (2004), ‘Nuclear Technoaesthetics: Sensory Politics from Trinity to the Virtual Bomb in Los Alamos’, *American Ethnologist*, Vol. 31, No. 3, August, p. 19.

5. Conclusion

It will never be possible to quantify exactly how close the world has come to the use of nuclear weapons and how probable nuclear use will be in the future. Probability is only one part of the risk equation. Indeed, for some, the high consequences of a nuclear detonation – whether deliberate or inadvertent, or based on a true set of facts or on misunderstanding and misinterpretation – will always be too high a risk. Perhaps the question could be phrased more meaningfully as ‘how close is “too close for comfort”’, along with the obvious corollary: ‘at what point would the risk be assessed as acceptable or comfortable?’ These interconnected questions are important for two reasons: the abstract nature of the nuclear threat and its devastating consequences are fuelling the temptation to ignore it, and the rhetoric of deterrence is often framed as defensive and seemingly risk-free.²¹⁸

Once it is established that the probability of use is not zero, the political implications require consideration. Overconfidence in knowledge leads to greater vulnerability and requires policies of prevention, along with a readiness to take responsibility for the possibility of a disaster. Experts often forget that unprecedented and unpredictable events happen very often. Awareness is not enough since it is well established that experts do not always believe in what they know, let alone act upon their knowledge. However, awareness is a necessary first step for developing prudence.

The United States, Russia, France and the United Kingdom have the capability to launch a strategic nuclear attack within minutes. Nuclear weapons are particularly dangerous in the contemporary world order where the logic of and belief in nuclear deterrence has been called into serious question by historians and military strategists. There are many events that demonstrate the fragility of nuclear deterrence, including technical malfunctions and miscommunication. Given the large number of nuclear weapons in existence, inconsistency in nuclear safety cultures and practices across states, and, as evidenced by the case studies, the demonstrated risk of inadvertent nuclear use, a closer examination of certain high-risk areas is warranted. However well thought through, decision-making is always vulnerable to lack of information, miscommunication and misinterpretation. These risks are particularly heightened during times of crisis and in regions that are prone to military confrontation.

It is impossible to say whether the risk of near misses has increased over time. This is primarily because it is not possible to have a complete sense of the number of near misses and therefore to determine if and when there was a greater concentration of them. While the consequences of a nuclear detonation have remained relatively consistent, levels of risk probability are difficult to estimate. It took decades to learn about the role of misperceptions in the Cuban missile crisis, and there is no reason to assume that the full picture has been drawn.

However well thought through, decision-making is always vulnerable to lack of information, miscommunication and misinterpretation.

This report does not intend to undermine current nuclear policies or postures, but rather to suggest that history demonstrates there is cause for concern over the inadvertent use of nuclear weapons. Given the extreme consequences, whatever the probability, this is no small risk. The cases presented here are analysed not to encourage alarmist responses but in order to promote a fuller discussion, to avoid future close calls and, ultimately, to prevent the use of nuclear weapons.

²¹⁸ Already in the 1950s, Gunter Anders had identified our common condition of ‘inverted utopians’: they are incapable of realizing the realities they have produced with nuclear weapons. See Anders, Gunter (1962), ‘Theses for the Atomic Age’, *The Massachusetts Review*, Vol. 3, No. 3, Spring, p. 496. This text is derived from a seminar Anders gave at the Free University in Berlin in February 1959.

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