

CHAPTER 8

SECURING NUCLEAR ARSENALS IN TIMES OF POLITICAL TURMOIL: “TOP 10” LESSONS LEARNED

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Each of the four case studies examined in this project—the erstwhile “nuclear coup” in French Algeria in 1961, the Red Guards uprising in China in 1967, the turbulence in Pakistan since the 1977 military coup, and the slide to dissolution of the Soviet Union during 1990-91—provides a fascinating account of how centralized control over nuclear weapons was more or less imperiled by political upheaval and the lengths to which political and military institutions had to go to keep the weapons out of the wrong hands. The lengths to which they went include hasty detonation of a nuclear test device, the use of deadly force to quell a rebellion by nuclear engineers, urgent redeployment of nuclear weapon components to secret locations, or the improvised use of bombers and cannon fire to exfiltrate weapons to more secure regions. The authors are careful not to exaggerate the risk of nuclear weapon seizure in these incidents; there is no public evidence that nuclear devices fell into the wrong hands. Nonetheless, there is ample cause for concern that the margin of security was uncomfortably thin.

Each episode carried its own complexities. The A. Q. Khan proliferation network that operated from

Pakistan for decades underscores that the customary focus on the security of weapons and delivery systems can leave a gaping hole in terms of access to nuclear weapons-related design information and production components. This control failure has helped fuel proliferation in Iran and North Korea. The Soviet case highlights the fact that nuclear launch authority can be rapidly misappropriated in a coup and that disputes over nuclear weapons control can be a leading indicator of the imminent collapse of a nation-state. The Algerian episode points to the pivotal role individual military commanders can play in determining whether rebels succeed or fail in bolstering their cause with a nuclear capability. The China case demonstrates how domestic political turmoil can leave an indelible impression on a country's nuclear custodians, such that centralized warhead storage becomes the overriding design principle.

This chapter briefly surveys the four case studies, highlighting key facets, major cross-cutting themes, lingering uncertainties, and potential "What ifs." Building on the studious efforts of the case study authors, it offers a "Top 10" list of lessons to be learned, as the global community seeks to come to grips with how to insulate nuclear weapons from what is likely to be recurring political turmoil over the next half-century.

THE FRENCH NUCLEAR COUP IN ALGERIA, 1961

Bruno Tertrais's original research has expanded our understanding of the so-called nuclear coup in French Algeria in 1961. The episode may come into sharper focus still as further details are unearthed. In any event, it is clear that the status of the nuclear device

at the Reggan test site was a top priority for President Charles de Gaulle as the Algerian coup came to light, discussing it with the prime minister on April 22. Yet, the apparent urgency to test the device on April 24 was not explicitly linked to the coup in Elysee's communique to the Atomic Energy Commission (*Commissariat à l'énergie atomique* [CEA]) or Reggan. Nor do we have any mention by the central authorities in Paris of taking all the steps necessary to prevent the device from falling into the rebels' hands. The apparent absence of contingency planning in the event the nuclear device fell into rebel control is notable. Unexplored options in this regard include reinforcing Reggan with loyalists, e.g., paratroops (depending on the French order of battle [ORBAT] at the time), conducting an air strike against the test facilities, or issuing instructions to CEA staff to destroy key components — e.g. neutron initiator, explosive lenses, etc. Normal bureaucratic procedures were not superseded. The April 23 directive merely reverted to the original "On or about April 24" test date that had been set on March 30, before more time was requested for technical preparation of the device. The bland communique from Paris on April 25 announcing the test also was indicative of a desire to downplay the risk of device seizure. But practically speaking — and contrary to the characterization made by Tertrais — de Gaulle *did* order the test to take place as soon as possible. Again, further official disclosures may clarify how much the risk of device capture weighed in the decision to speed up the test. Until then, we can reasonably conclude that the test date was hastily advanced, though the situation was not desperate. Here it is interesting to speculate to what extent de Gaulle's behavior reflected a political imperative, as well as a cultural predilection, to convey self-confidence in a crisis.

By contrast, the nuclear device and impending test event was not a premeditated priority for the coup generals (e.g., Raoul Salan and Edmond Jouhand) who were anti-nuclear, but rather a target of opportunity. There was some, but generally poor, rebel awareness of the device (including the Radio-Alger account of whether the device components had already been sent to Reggan; Maurice Challe's seemingly accidental discovery of the test via the NOTAM [Notice to Airmen]; and Pierre Billaud's interrogation by rebel forces in Algiers and subsequent clearance to proceed to Reggan). Nonetheless, Challe sensed an opportunity for exploitation when he issued his April 23 directive to Jean Bastien Thiry not to explode his "little bomb," directing him to "Keep it for 'us,' it will always be useful." Challe's reference to "always" suggests intent to retain the device indefinitely. It is thus evident that the rebels were improvising and were ignorant of technicalities that could render the device inoperative after a certain "expiration date" (e.g., the reliability of the neutron initiator decreased over an extended period), particularly if they were cut off from CEA expertise.¹

In hindsight, Challe was overconfident that he had Thiry's loyalty. There is no evidence that Challe had a contingency plan to prevent a test he had not authorized. He apparently made no effort to cut Reggan's communication links with Paris, nor to cast doubt on who was responsible for the test. Presumably, the coup was already unraveling at that point, but such a counterclaim might have provided a last-ditch effort to rally forces to the rebels' cause or at least cast doubt on de Gaulle's span of control.

The Algerian episode underscores that the leading rebel generals were not enamored with nuclear

weapons, nor did they see any dignity to be had in nuclear blackmail. This nuclear disdain was likely a pivotal factor in preventing a compromise of nuclear control in 1961. Now that nuclear weapons have been more widely socialized in the intervening half-century, it remains an open question as to whether future rebels in a nuclear-armed state would be similarly disinclined to exploit any nuclear devices within their reach.

A key facet of the Algerian episode is the extent to which Thiry really delayed the test. Was it even 24 hours? After all, the order from Paris to test had been received on April 23, and accounts suggest that, probably on the morning of April 24, Thiry decided to test the following day; he ordered troops to the field the afternoon of the 24th. Since the neutron initiator had yet to be completed on the 23rd, was a test on the 24th even technically possible? If not, the case for Thiry's prevarication becomes slim.

Nor did Thiry seem to perceive an urgent need to scuttle the device. There was evidently no such indication in the Elysee directive on April 23, nor was there any indication from Challe the same day that he was sending forces to, or ordering the armored forces at Reggan to ensure compliance with his test suspension order (assuming such links to the armored units existed at the time). This contrasts with Etienne Viard and other CEA staff at Reggan "urging" Thiry—as if he was procrastinating—to proceed with the test to prevent the rebels from acquiring a bargaining chip. It is not unreasonable to postulate that in times of political turmoil, bureaucratic figures and entities will "default" to standard operating procedures—in this case, proceeding with the usual test preparations, albeit on a compressed schedule.

But how are we to explain why the test was not postponed as weather conditions at Reggan deteriorated on April 25? Under such circumstances the test normally would have been delayed; Thiry had the authority to do so but opted not to exercise it. Thiry's decision to proceed perhaps reflects his recognition that the coup was destined to fail. After all, he had contradictory test orders from Paris and Algiers, yet appeared more concerned with the consequences of disappointing the former.

We are left to ponder how the outcome of the coup might have differed if Thiry had immediately (i.e., on April 21-22) and unequivocally sided with the rebels. Tertrais expresses his skepticism in this regard. But since France did not test its next nuclear device until November 1961, might there have been a window when the Algerian rebels had a nuclear advantage over the French mainland, which might have been exploited to rally more support to their cause?

What if Reggan's communications had been cut with Paris (i.e., Elysee, Ministry of Defense, and CEA)? How might that have changed crisis decisionmaking? Would de Gaulle's dramatic television speech on April 23 have been as effective if the rebels were believed to have control of the nuclear device? If the links had been cut, would de Gaulle have known of CEA loyalists (Viard *et al.*) at Reggan and been able to count on them to sabotage the device so that he could call a rebel nuclear bluff? Would the French president have continued to keep Washington in the dark,² or been forced to bring it into confidence and request assistance in recovering the device?

Here, we might assert that French nuclear command and control "failed safe" by good fortune, not design. Such a characterization is not unreasonable,

given the relative immaturity of France's nuclear weapons program at the time. Still, while not necessarily feeding alarmist interpretations (which no doubt are further attenuated by the passage of time), the Algerian nuclear situation was perhaps more tenuous, more susceptible to transformation, than appreciated. Indeed, the chapter could support such an interpretation, since, as pointed out, in reforming French presidential authority the following year, de Gaulle perceived the need to ensure that he would have sole authority over the employment of French nuclear weapons.

THE LEGACY OF CHINA'S CULTURAL REVOLUTION ON NUCLEAR WARHEAD SECURITY

Mark Stokes calls attention to the upheaval in Chinese society caused by the Cultural Revolution of 1966-76 and the way it impacted China's approach to nuclear warhead security. As with France, China's crisis over nuclear weapons control came very soon after its entry into the nuclear weapons club. However, the Cultural Revolution provided a distinct challenge to nuclear weapons control in that revolutionary ardor and its disruptive effects were being actively promoted by the central political authority, Mao Zedong.

As Stokes recounts, this political disturbance quickly made its way into China's nuclear weapons complex. Scientific and technical cadres who designed and built the country's nuclear weapons were soon pitted against one another, not just ideologically, but physically. The country's youth, stirred up by Mao, organized into the Red Guards paramilitary units and sought to forcibly take control of nuclear weapons

facilities in Harbin. One such radical group from a nuclear weapons plant, 221 Factory, occupied a provincial newspaper office in February 1967; its forcible eviction by the People's Liberation Army (PLA) resulted in the deaths of 169 people. Such was the uprising's threat to China's nuclear weapons production and testing facilities that senior PLA officers warned Mao they would forcibly take control of the sites if he did not rein in the Red Guards.

A particularly disconcerting aspect of the Cultural Revolution was the ideological pressure the Red Guards exerted over nuclear weapons policy under the premise that radicalism and atomic weapons were similarly explosive and both should be fully and expeditiously unleashed. This led to a risky operation wherein China's fledgling nuclear command flight-tested a nuclear-armed ballistic missile over populated portions of the country en route to its detonation in the western Xinjiang Province. We can only speculate to what extremes the Red Guards might have applied their nuclear ardor had they gained direct control over China's nuclear weapons complex. The episode may yet provide clues as to what we might expect in the event revolutionary Iran manages to acquire a nuclear arsenal of its own.

Stokes reconstructs how this period of domestic political instability helped shape China's approach to nuclear warhead security and the prominent role 22 Base has played in this regard. It is striking in that, for the first 35 years of China's nuclear force, control over warheads was maintained by 22 Base under the aegis of the PLA's National Defense Science and Technology Commission; that is, outside the delivery system chain of command. It was not until the Cultural Revolution fully receded in 1979 that 22 Base was subordinated to

the Second Artillery Corps; even then the separation between warhead custody and delivery systems was maintained.

While Stokes is careful to note the influence of external factors—namely, deteriorating relations with Moscow in the 1960s—he observes that the chaos unleashed by the Cultural Revolution prompted China’s nuclear custodians to centralize nuclear warhead storage at the 22 Base underground complex in Taibai. It is from here that nuclear warheads are “loaned” out in small numbers to Second Artillery missile regiment storage facilities, where they are kept physically separated from the missiles, the better to reduce vulnerabilities to political instability in a given region. Indeed, this emphasis on centralized control and both physical and organizational separation between warhead and launcher comes at the price of increasing China’s vulnerability to a disarming first strike. To compensate, China relies on opacity to keep its adversaries guessing as to the precise details of warhead and launcher status and location. Indeed, the legacy of the struggle for control over China’s nuclear complex during the 1960s is the enduring reluctance of the Chinese leadership to accept numerous offers from the United States to embrace greater transparency as a means of building nuclear stability.

POLITICAL TRANSITIONS AND NUCLEAR MANAGEMENT IN PAKISTAN

Feroz Khan’s chapter traces the impact of national leadership turnover on Pakistan’s nuclear weapons program. It observes that there were two “political transitions during which there could have been a control problem [President Zia’s death in 1988 and

the joint resignation of the prime minister and president in 1993], but on each occasion, the military had an organizational system in place to prevent any such danger.”³ Upon closer inspection, and not unlike in the Algerian case, this system seems to be a default mechanism rather than a plan. Moreover, this assertion seems to be contradicted by the observation that “It took a decade to develop a robust command system, which transited to the civilian [leadership] . . . in 2008.”⁴

There are, unfortunately, critical gaps in the account to support the chapter’s conclusion. Specifically, who were the key figures and what were the decisionmaking processes by which Pakistan violated its secret agreement with the United States not to produce highly enriched uranium (HEU), conduct the 1998 nuclear tests (also, technically a breach of the U.S. accord), and redeploy nuclear weapon components following the September 11, 2001, attacks by al-Qaeda against the United States?⁵ Additionally, elaboration is needed on how Pakistan’s nuclear “command and control [has been] tested under regional crises and domestic violence.”⁶ Were there incidents that challenged nuclear command and control (C2) in some fashion?

Notably, the chapter does not delve deeply into the A. Q. Khan debacle, asserting that the nuclear weapons program “remained firewalled” from political turmoil. The chapter contends that the Khan network operated “[b]efore the military take over and formulation of [the Strategic Planning Division] SPD.” Yet, Iran has documented with the International Atomic Energy Agency (IAEA) that its first dealings with the network took place in 1987, a decade after General Zia’s coup and while he was still in power, and contin-

ued through at least 1995, 2 years after then-President Ghulam Ishaq Khan transferred the nuclear dossier to Army General Headquarters (GHQ).

Also, the chapter makes no reference to Sultan Bashiruddin Mahmood, a former high-ranking Pakistan Atomic Energy Commission (PAEC) official who engaged in nuclear weapons consultations with Osama bin Laden.⁷ In this regard, there is a tendency to understate the role of informal knowledge on the part of the Pakistan military, while claiming its ignorance of the Khan network. Historically, it is noted that the military was “well aware” of the nature of the nuclear program in the 1970s, even if it lacked details.⁸ From 1988 on, the COAS started managing nuclear development on behalf of the president.⁹ A. Q. Khan has asserted that the Pakistan Army leadership was well aware of the nuclear assistance his laboratory was providing to Iran and North Korea and provided material support.¹⁰ Given the influence of the Pakistan Army and that the GHQ was the agreed locus and coordination of resources for the nuclear weapons program, how is it that the military did not have the legal authority to intervene in the autonomy of the scientists until after Musharraf’s coup in 1998?

Further, Bashiruddin’s Islamic “charity,” Ummah Tameer-e-Nau, included retired Pakistani generals. If the Pakistan military was also unaware of Bashiruddin’s nuclear freelancing, the claims that nuclear command and control was under firm control ring hollow. In spite of the Bashiruddin “surprise,” there are hints that religious radicalization was considered a threat to Pakistan’s nuclear C2 as early as 1977 and became a de facto selection criterion for personnel.¹¹ But the subject is not adequately addressed, and so we can form no opinion as to how robust the nuclear C2 system is against radicalized insiders.

The issue of Benazir Bhutto's access to the nuclear weapons program is contentious,¹² and the chapter could benefit from greater balance. Namely, the assertion that Bhutto was excluded from the program only after receiving the Central Intelligence Agency (CIA) briefing in June 1989 does not explain why she was not granted access to Kahuta, e.g., beforehand.¹³ Since President Ghulam Ishaq Khan retained the secret nuclear files throughout Nawaz Sharif's first term as prime minister from 1990 to 1993 (turning them over to GHQ in 1993, only as a result of being forced to retire), a pattern of prime ministerial mistrust and, at best, selective access to the nuclear dossier is evident.

Notably, Pakistan's Western-trained civilian scientists became convinced that in an environment of competing demands on scarce resources, nuclear energy development would take place only if they could interest the national leadership in developing nuclear weapons. This was a sad and misguided rationale. As Khan's chapter notes, during the military rule of 1958-71, Pakistan's Army leaders expressed no such desire. Rather, the leading driver of nuclear weapons development was a civilian, Zulfikar Ali Bhutto, who came to power in 1971. Bhutto enlisted the material support of the Army in the nuclear weapons program following the loss of East Pakistan, but kept decision-making in civilian hands until he was deposed in a military coup led by General Zia in 1977.

The chapter cites bureaucratic competition as a driver of Pakistan's nuclearization, but the theme warrants further consideration. For instance, how much did competition between Munir Khan and A. Q. Khan influence the pace and scope of fissile material production and delivery system development?

THE DISSOLUTION OF THE SOVIET UNION

Nikolai Sokov's chapter identifies at least three cases of potential loss of nuclear weapons control as the Soviet Union collapsed. It took nearly 5 years (1991-96) for control of all Soviet nuclear weapons to be fully restored by Moscow. Nearly a third of Soviet successor states had nuclear weapons on their territory when the Union of Soviet Socialist Republics (USSR) collapsed, posing complex challenges for centralized control. Sokov underscores the importance of nuclear custodians' loyalty to their mission, even if not to the political leadership, to weather this political storm.

Azerbaijan Seizure Attempt.

The hurried withdrawal in January 1990 of nuclear warheads for air defense missiles stationed in Azerbaijan (possibly in response to a fire at a Baku nuclear weapons depot), seemingly required technical and procedural improvisation. Cannon fire was needed to ensure that the bombers carrying the warheads could escape intruders who had penetrated the airbase perimeter and blocked the runway. Given the hasty nature of this operation, it is not likely that any plans existed to exfiltrate stolen nuclear weapons.

Sokov notes that this episode triggered a massive withdrawal of tactical nuclear weapons to the territories of Russia, Belarus, Kazakhstan, and Ukraine by the spring of 1991 – which occurred in almost complete secrecy. He further observes that the downside of this improvisation was inadequate record keeping; weapons were transferred to almost random facilities, resulting in safety problems as the maximum number of warheads per bunker was exceeded, and

personnel had trouble maintaining controlled environments inside – a problem not resolved for another 15 years.¹⁴ So how dedicated were the custodians and political authorities beyond physical consolidation of nuclear weapons? How high a priority was nuclear weapons safety?

1991 Coup.

Sokov's account of the 1991 coup against Soviet President Mikhail Gorbachev adds important detail that makes it clear that control of the entire Soviet nuclear arsenal was compromised. Strategic and tactical nuclear forces were put on high alert by the coup leaders in a dramatic fashion, with nuclear weapons being uploaded to theater-level strike aircraft and associated launch codes distributed for the first time in memory; Northern Fleet submarines were being readied to launch their nuclear missiles from pier-side, if so ordered. This heightened nuclear alert was lowered before long, and the coup quickly unraveled, but the potential for an international nuclear crisis was undeniable.

In juxtaposing the 1991 Soviet coup with the French coup that preceded it by 3 decades, we see that whether a country is a nascent or mature nuclear weapons state, who has control over nuclear weapons inevitably colors the struggle for national political control. De Gaulle moved quickly to deny his rebellious generals in Algeria access to a nuclear test device by expending it. The Soviet coup plotters immediately seized Gorbachev's portable communication device, or "Cheget," to deepen his physical isolation and circumvent unsympathetic senior officers in the nuclear chain of command. They then activated the nuclear

force to warn off any would-be interventionists and signal a return to Soviet assertiveness, but in so doing, they seriously increased the risk of inadvertent nuclear escalation.

As Sokov explains, the nature of the Soviet command and control system meant that simply by isolating the Soviet president from his Cheget, the coup leaders had achieved launch authority over the nuclear arsenal. The responsiveness of the nuclear forces to the high alert order indicates that nuclear units were accepting direction from the coup leaders. We can only speculate how the crisis may have spiraled if the United States had responded in kind to the Soviet nuclear alert and if the political crisis in Moscow had endured. Sokov further points out that while presidential security and communication systems were immediately revised after the coup failed, certain political vulnerabilities in the Cheget system remain, a symptom of the trade-offs between a system designed to ensure a nuclear response in the event of a nuclear attack and one optimized to ensure nuclear lockdown in the event of domestic political turmoil.

Collapse of the USSR.

The ensuing collapse of the Soviet Union by late-December 1991 underscores that nuclear weapons control is a function of time: The longer political uncertainty exists, the greater the chance political authorities will lose control over nuclear weapons. Moreover, Sokov keenly explains how loss of control over nuclear weapons can precede national dissolution. It was clear that Moscow perceived it had lost control of nuclear weapons – in terms of physical withdrawal to the territory of Russia – some months before the USSR was dissolved.

Notably, the risks of nuclear dissolution of the Russian Federation were anticipated by Russian academics in October 1991. It seems likely that given the prevailing political turbulence, academic thinking outpaced the Russian government in this regard. This, in turn, begs the question of whether it is possible for governments to plan for nuclear control arrangements in the event the state itself dissolves. To their further credit, Russian academics also foresaw the military-technical, intelligence, and economic risks of dependency in the event the Soviet nuclear enterprise was divided up among successor states.

Adding a more complex twist in October 1991—that is, prior to the dissolution of the Soviet Union, Ukraine sought to ensure that nuclear weapons stationed on its territory could not be launched by Moscow. In November-December, Ukraine's leader requested a study of whether such weapons could be used for the purposes of *deterring* Russia. Divided loyalties among the technical experts conducting the assessment seem to have biased the results against the feasibility of such a move. Also prior to Soviet dissolution, Ukraine allegedly was able to obtain nuclear weapons maintenance and refurbishment manuals from a Russian nuclear weapons lab. This reflects the risks of political ambiguity and "bureaucratic autopilot."

Further compounding matters, in February 1992, Ukraine halted the withdrawal of tactical nuclear weapons from its territory. Sokov points out that technically Ukraine was believed to be capable of assuming operational control over nuclear weapons in just 9 months. Kiev then engaged in a concerted propaganda effort to persuade Soviet forces on Ukrainian soil to switch allegiances, luring all the strategic rocket

and air force delivery units by April 1992. Two nuclear weapon custodial units at Ukrainian air bases followed suit in 1993. Sokov observes that, in effect, it was left to the discretion of individual military units and even individual officers to whom they would grant control over nuclear weapons. Ukraine lacked access to the weapons arming codes, however, and targeting information had been removed from air-launched cruise missiles (ALCMs) by the 12th Glavnoye Upravleniye Ministerstvo Oborony (GUMO)¹⁵ prior to the shift in allegiance. Underscoring the risks of national dissolution, permissive action links were the only element of C2 not controlled at the unit level.

Political maneuvering was pervasive as Moscow struggled to retain full control over Soviet nuclear forces. In April 1992, Belarus demanded compensation and security guarantees from the West to relinquish nuclear weapons on its soil. Russia, for its part, overstated its degree of control over the former-Soviet nuclear stockpile to discourage U.S. interference in its discussions with former Soviet republics. The temptation for central authorities to exaggerate their control over nuclear events is not limited to the Russian leadership (witness the assurances by Tokyo, Japan, that the situation at Fukushima was under control). We can expect to see this kind of behavior in future nuclear control crises and should be prepared to challenge it head on, through private and official channels, backed by sustained media scrutiny.

Sokov observes that the disintegration of central authority creates a legal and psychological vacuum for the military. It also creates a political void that the military may seek to fill. For 2 to 3 months, two of the three suitcases containing nuclear launch codes, including one allocated to the civilian leadership — that

is, the minister of defense—were controlled by General Boris Shaposhnikov, who then tried to assert himself as equal to a head of state and to dictate nuclear weapons policy to the political leadership. Retaining military unity was a core concern for Shaposhnikov and his military cohorts vis-à-vis the political leadership. Preserving military unity would likely be a top priority in future nuclear state dissolutions, and political authorities will need to address this concern quickly to dissipate any momentum toward military dictatorships. Keeping a close watch on potential Shaposhnikovs is a prudent task in this regard.

The Suitcase Nuke Saga.

Disturbingly, Sokov points out that a thorough inventory of Soviet tactical nuclear weapons withdrawn to Russia in 1992 was not undertaken by Moscow until 1996, and even then, only in response to allegations that Chechnyan rebels had acquired portable, so-called suitcase, nuclear weapons. It took another 5 years for the 12th GUMO to reveal that all such portable nuclear devices had been eliminated, with confirmation by head of the State Security Council Denisov, not coming until 2004. This provides further evidence that the less “sexy” aspects of nuclear weapons control, storage and accountability are a weak link in Russian nuclear control, and likely elsewhere. Indeed, the United States is not immune in this regard, as evidence by the unauthorized and unwitting relocation of nuclear weapons aboard a B-52 bomber in 2007.

“TOP 10 LESSONS” FOR THE CONTROL OF NUCLEAR WEAPONS DURING POLITICAL TURMOIL

Insight: Political ambiguity and “bureaucratic autopilot” invite the loss of nuclear weapons control.

- Because no special concern was voiced or emergency measures directed by Paris, the Reggan test site followed standard (albeit accelerated) operating procedures in the midst of a coup, which posed a threat of nuclear seizure.
- Just prior to the dissolution of the USSR, Ukraine allegedly was able to obtain nuclear weapons maintenance and refurbishment manuals from a Russian nuclear weapons lab—the better to help it hold on to Soviet nuclear weapons and use them to deter Moscow.

Lesson #1: It is better for a National Command Authority to make the “Commander’s Intent” known—that is, to err on the side of explicit and extraordinary instructions to nuclear entities—and to have in place authorities, regulations, and procedures to curtail nuclear flows in times of domestic political crisis.

Insight: Freelancing by scientists in the nuclear weapons complex is no less threatening than loss of command over a weapon by the military and may pose a greater control challenge to countries where the military is the dominant state institution.

- A. Q. Khan is a “poster child” in this regard.

Lesson #2: Controls over nuclear weapons-related technology, materials, and scientific and technical expertise need to be as stringent as the weapons and delivery systems themselves. This calls for an inte-

grated, “whole of government” approach to security all along the nuclear weapon life cycle, and probably bears socialization amongst the nuclear-weapons states to hedge against cultural idiosyncrasies. The Pakistan case study indicates it was not until 1998 that the military believed it had the authority to challenge the autonomy of nuclear scientists – quite late in the Pakistani nuclear weapons program.

Insight: Because nuclear accounting lacks sex appeal, it tends to be neglected and erodes nuclear control.

- A thorough inventory of Soviet tactical nuclear weapons withdrawn to Russia in 1992 was not undertaken by Moscow until 1996, and even then, only in response to allegations that Chechnyan rebels had acquired portable, so-called suitcase, nuclear weapons.
- It took another 5 years for the 12th GUMO to reveal that all such portable nuclear devices had been eliminated, with confirmation by the head of the State Security Council Igor Denisov not coming until 2004.
- With regard to Pakistan, Feroz Khan noted the highly technical nature of the nuclear dossier, prompting the COAS to turn it over to the Army’s Corps of Engineers.
- The United States has not been immune from inadequate nuclear accounting, as the Minot Air Base incident makes perfectly clear.

Lesson #3: Nuclear-weapons states must actively promote strict nuclear accountancy using a variety of tools (e.g., measure of performance standards, budgetary resourcing, career development, and organizational autonomy). This is a legitimate subject of mili-

tary to military and laboratory to laboratory dialogues. A benchmark for success in this regard is when we see not only nuclear missiles in parade on national independence days, but also, right behind them, a parade float carrying the nuclear “bean counters.” The banner on such a float might read, “Not only do we possess nuclear weapons, but we know where all of them are.”

Insight: Central authorities will tend to overstate their degree of control over nuclear weapons during a political crisis.

- Political motivation: To discourage meddling by outsiders (e.g., Russia).
- Cultural motivation: To save face.
- Personal motivation: To convey self-confidence (e.g., de Gaulle).
- This is a phenomenon not limited to the case studies (i.e., Japan and Fukushima, the United States and the Minot incident).

Lesson #4: We can expect to see this kind of behavior in future nuclear control crises and should be prepared to challenge it head on, through private and official channels backed by sustained media scrutiny. This might have unintended consequences, but on balance, probably serves the cause of nuclear accountability and crisis stability.

Insight: It is unrealistic to expect central authorities to plan for the control of nuclear weapons after their own demise.

- Is it possible to design in advance a nuclear fail-safe model for political dissolution without being unduly fatalistic, unpatriotic, or treasonous? For example, where is the plan for controlling America’s nuclear arsenal in the event the United States collapses?

- Even in a deep political crisis, state mechanisms are slow to react (e.g., Russia).
- It was Russian *academics* who, in October 1991, were identifying the nuclear implications of the collapse of the USSR and even the Russian Federation.

Lesson #5: It likely falls to quasi- or non-state entities to take up these tasks, using a variety of analytical techniques (including alternative futures and gaming), to be poised to assist governments in times of crisis.

Insight: In the event of the political dissolution of another nuclear-weapons state, rival political authorities will enter a competition to win the loyalty of personnel in direct control of nuclear weapons.

- Russia vs. Ukraine, 1992; to a lesser degree, Algeria, 1961.
- To what extent have there been negotiations among Pakistan's Corps Commanders and the Strategic Plans Division during times of political turmoil?
- As political authorities struggle to retain or achieve control, unbiased technical advice on nuclear matters (i.e., what is or is not feasible, desirable) will be in short supply (e.g., Ukraine).

Lesson #6: The international community should consider ways to influence this contest to ensure responsible and reliable nuclear weapons control in the event of future state collapse. Because the granting of control over nuclear weapons could be left to individual military units and even individual officers, our intelligence communities should be prepared to "reach out and touch" key people.

Insight: Military institutions abhor political vacuums and can leverage their control over nuclear weapons in an attempt to fill them.

- For Pakistan, this phenomenon is probably just reinforcement of Army preponderance, which is why the question of whether the generals can countenance real civilian control is an interesting one.
- For 2 to 3 months, two of the three “Chegets” containing nuclear launch codes, including one allocated to the civilian leadership—that is, the minister of defense—were controlled by Shaposhnikov, who then tried to assert himself as equal to a head of state and dictate nuclear weapons policy to the political leadership.

Lesson #7: Whether the military emerges from a nuclear control crisis as a dictatorship bears close watching. Preserving military unity will be a “hot button” issue for this group, suggesting that any armed forces restructuring should be done with great care and accompanied by mechanisms to establish or reinforce civilian control. Keeping a close watch on potential Shaposhnikovs is a prudent task in this regard.

Insight: Approaches to nuclear weapon design and maintenance will impact the feasibility of nuclear successor states preserving, in an operational sense, their nuclear inheritance.

- Limited value of the test device at Reggan.
- Russian and Chinese warhead shelf lives.
- Economic viability of successor states.

Lesson #8: We should anticipate how these technical, operational, and economic constraints might affect future nuclear inheritances in regions of concern, such as the Korean Peninsula.

Insight: In the event of nuclear dissolution, there will be no quick routes to final agreements regarding the disposition of inherited nuclear weapons.

- Rapid dissolution of the USSR led to hasty, generalized agreements.
- Ukraine shows that underlying rivalries and insecurities among successor states can turn nuclear rejection into nuclear retention.

Lesson #9: The cases of Ukraine, Belarus, and Kazakhstan should be further scrutinized to develop a playbook of specific obligations regarding the disposition of nuclear weapons to be sought in future contingencies.

Insight: The military tends to be seen as the safekeeper of nuclear weapons during political upheaval.

- The main theme of the Russia and Pakistan case studies.
- Algeria, 1961: Just how much did Thiry waver in conducting the test?

Lesson #10: The extent to which the military can be counted upon to preserve control of nuclear weapons during political crises is a function of many influences, including prevailing patterns of civil-military relations and the technical sophistication or maturity of the arsenal in question. It is not clear that the armed forces provide the only solution; other domestic custodians may be more appropriate (e.g., civilian-scientific control or a super-elite military unit effectively outside the military chain of command, such as China's 22 Base). More novel approaches may also merit consideration (e.g., international safekeeping).

ENDNOTES - CHAPTER 8

1. Polonium-210, used in nuclear weapons as a neutron initiator, has a half-life of 138 days, eventually decaying to lead-206. See "Factsheets and FAQs: Polonium-210," *International Atomic Energy Agency*, available from www.iaea.org/Publications/Factsheets/English/polonium210.html.

2. As Tertrais observed in his chapter:

The details of the Reggan events remained secret for several weeks, and there is no evidence that the United States, for instance, was aware in real time of what was going on at Reggan in April 1961. No mention of the episode is made in the studies of U.S. archives done by French experts. See Vincent Nouzille, *Des secrets si bien gardés: Les dossiers de la Maison-Blanche et de la CIA sur la France et ses présidents 1958-1981* (*The Secret So Well Kept: Records of the White House and CIA on France and Its Presidents 1958-1981*), Paris, France: Fayard, 2010; and Vaïsse, *Comment de Gaulle fit échouer le putsch d'Alger*. No U.S. official analysis of the events has been found by this author. A declassified 1964 CIA study entitled comments on each French test, but the description is excised in the declassified version. See Central Intelligence Agency, *The French Nuclear Weapon Program*, OSI-SR/64-10, March 27, 1964, available from www.foia.cia.gov/docs/DOC_0001522915/DOC_0001522915.pdf. Brian Jenkins had access to other previously classified documents and confirms that no mention of the test appears in any of them. Personal communication with the author, March 2012.

3. See Khan's chapter in this volume, p. 178.

4. *Ibid.*, p. 179.

5. "Pakistan Moves Nuclear Weapons," *The Washington Post*, November 11, 2011, available from www.washingtonpost.com/ac2/wp-dyn/A9038-2001Nov10?language=printer.

6. See Khan's chapter in this volume, p. 172.

7. See, for example, "Rogue Scientists Gave Bin Laden Nuclear Secrets," *The Telegraph*, December 1, 2001, available from www.telegraph.co.uk.

telegraph.co.uk/education/3291277/Rogue-scientists-gave-bin-Laden-nuclear-secrets.html.

8. See Khan's chapter in this volume, p. 156.

9. *Ibid.*, p. 162.

10. See A. Q. Khan's 13-page "confession," available from www.foxnews.com/world/2011/09/15/aq-khans-thirteen-page-confession/.

11. Ghulam Ishaq Khan was a long-time civil servant and Zia's finance minister and later Chairman of the Senate. After the accidental death of President Zia, he became acting president of Pakistan; after the general elections of 1988, he was elected the president of Pakistan.

12. The author interviewed General Beg in Rawalpindi in 1993.

13. See, for example, Pervez Hoodbhoy's account, available from tribune.com.pk/story/325571/the-bomb-iran-saudi-arabia-and-pakistan/.

14. See "Rossiya Pervypolnila Plany po Sokrashcheniyu Yadernogo Oruzhiya" ("Russia Has Exceeded the Plan for Reduction of Nuclear Weapons"), *RIA-Novosti*, June 22, 2005, available from rian.ru/politics/20050622/40566772.html; and Nikolai Poroskov, "Takticheskii Yadernyi Kozyr" ("A Tactical Nuclear Ace"), *Vremya Novostei (News Time)*, September 7, 2007.

15. Glavnoye Upravleniye Ministerstvo Oborony, or Main Directorate of the Ministry of Defense.