



# Setting the Deadline for Nuclear Weapon Removal from Host States under the Treaty on the Prohibition of Nuclear Weapons

Moritz Kütt <sup>a,b</sup> and Zia Mian <sup>a</sup>

<sup>a</sup>Program on Science and Global Security, School of Public and International Affairs, Princeton University, Princeton, NJ, USA; <sup>b</sup>Institute for Peace Research and Security Policy at the University of Hamburg (IFSH), Hamburg, Germany

## ABSTRACT

The Treaty on the Prohibition of Nuclear Weapons requires that states which join the treaty while hosting nuclear weapons, “shall ensure the prompt removal of such weapons, as soon as possible but not later than a deadline to be determined by the first meeting of States Parties”. This article offers a basis for setting the weapon removal deadline under the new treaty. It describes briefly the experience of past removals of nuclear weapons from deployment in Cuba, East Germany, Taiwan, Hungary, South Korea, and Greece. It then outlines a plausible process of nuclear weapon removal from the current five nuclear weapon host countries, all holding nuclear weapons belonging to the United States, that reflects existing US nuclear weapon transport practices and capabilities. The analysis suggests the parties to the Treaty on the Prohibition of Nuclear Weapons could set a 90 day deadline for the safe and secure removal of nuclear weapons from host states.

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## Introduction

The Treaty on the Prohibition of Nuclear Weapons (TPNW), which entered into force on 22 January 2021 requires that the first meeting of its States Parties (1MSP) set a deadline for the maximum allowed time for the removal of foreign nuclear weapons from the national territory or places under the jurisdiction or control of any member state. This obligation is laid out in article 4.4 of the treaty (Treaty on the Prohibition of Nuclear Weapons 2017):

each State Party that has any nuclear weapons or other nuclear explosive devices in its territory or in any place under its jurisdiction or control that are owned, possessed or controlled by another State shall ensure the prompt removal of such weapons, as soon as possible but not later than a deadline to be determined by the first meeting of States Parties. Upon the removal of such weapons or other explosive devices, that State Party shall submit to the Secretary General of the United Nations a declaration that it has fulfilled its obligations under this Article.

**CONTACT** Moritz Kütt  [kuett@ifsh.de](mailto:kuett@ifsh.de)  Institute for Peace Research and Security Policy at the University of Hamburg (IFSH), Hamburg, Germany

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Article 4.4 seeks to address and end a practice often called “nuclear sharing” that has been at work for nearly 70 years but has been challenged (Timerbaev 1999; Alberque 2017; NAM 2019; Hayashi 2021). Currently, only the United States deploys nuclear weapons in other countries: these weapons are stationed in Belgium, Germany, Italy, the Netherlands, and Turkey, all members of the North Atlantic Treaty Organization (NATO).

The next section outlines several historical examples of nuclear weapon removals from past deployment. The cases presented are for the removal of nuclear weapons from Cuba (1962), East Germany (1959 and 1991), Taiwan (1974), Hungary (1988), South Korea (1991), and Greece (2001). Varying degrees of disclosure by the states involved and incomplete public information in terms of specific processes and schedules of decision-making and implementation mean that a standardized description for all of the historical cases of weapon removals presented in the article is not possible.

The article then summarizes the current status of nuclear weapon sharing and a description of the procedures currently required for weapon removal that could be relevant to the TPNW. The focus is on what would be involved in the removal of the US-owned nuclear weapons currently deployed in Belgium, Germany, Italy, the Netherlands, and Turkey that would have to be removed should these countries join the TPNW.

The article concludes by proposing a TPNW-mandated deadline for weapon removal of no more than 90 days for the period from a decision to remove the weapons from a host state to the physical removal of nuclear weapons from that host state.

## **Past Cases of Removal of Nuclear Weapons Stationed in Host States**

The United States, Soviet Union, and Britain are known to have stationed or deployed their nuclear weapons on the territory of other states. The United States is believed to have been the first to station nuclear weapons in another country and the only nuclear-armed state to still do so. The United States Department of Defense partially declassified in 1999 an official *History of the Custody and Deployment of Nuclear Weapons: July 1945 through September 1977*, which “traces the evolution of the custody, deployment authorizations, and dispersals” and notes that there were “disparities in numbers [...] due to different accounting procedures particularly prior to 1961” and “minor conflicts pertaining to individual totals by weapon” between the “accounts of the Defense Nuclear Agency and the Energy Research and Development Administration (now Department of Energy)” (United States Department of Defense 1978). The report excised the names of most countries where US nuclear weapons were deployed.

Independent analysts Thomas Cochran, William Arkin and Milton Hoenig in 1984, Arkin and Richard Fieldhouse in 1985, and Arkin and Robert Norris in 1992 provided an assessment of US weapon deployments (Cochran, Arkin, and Hoenig 1984; Arkin and Fieldhouse 1985; Arkin and Norris 1992). This was later updated in an analysis by Arkin, Norris, and Joshua Handler in 1998 (Arkin, Norris, and Handler 1998). Arkin, Norris, and William Burr were subsequently able to identify each country where US nuclear weapons were deployed that had been censored in the *History of the Custody and Deployment of Nuclear Weapons: July 1945 through September 1977* (Norris, Arkin, and Burr 1999). Among the findings was that the United States deployed fissile material

components for weapons abroad beginning in June 1951, with components for nine weapons sent to the western Pacific Island of Guam, and the first assembled nuclear weapons to be stationed in another country were US nuclear bombs deployed to Morocco in May 1954, followed by a similar deployment in September 1954 to Britain (Norris, Arkin, and Burr 1999).

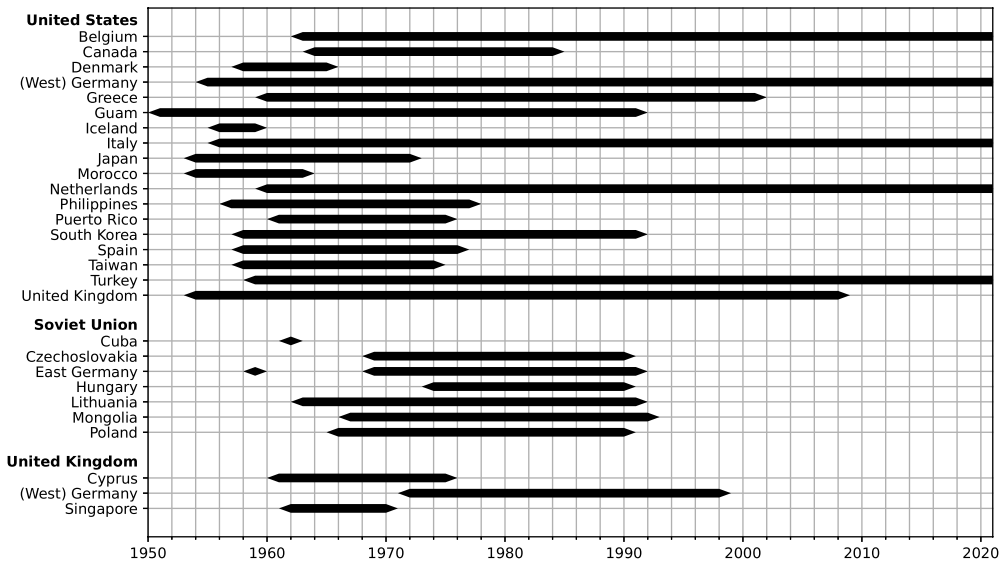
In the subsequent decade, US nuclear weapons also were stationed in then West Germany, Italy, Turkey, Netherlands, Greece, and Belgium, with the total number of US nuclear weapons in Europe rising to over 7000 by 1971 before falling to about 6000 nuclear weapons by the end of the 1970s and falling further to below 500 weapons in 1994 (Norris and Kristensen 2004). By 2014, there were about 180 US nuclear weapons stationed in Europe (Kristensen and Norris 2014a) and by 2017 the number was down to about 150 weapons (Kristensen and Norris 2017a). It has fallen further since and there are now estimated to be about 100 US nuclear weapons stationed in Europe (Kristensen and Korda 2021). The scale of US nuclear weapon stationing and removal from host countries is perhaps most vivid in the case of West Germany, which hosted over 5100 US nuclear weapons in 1975, a number that had fallen to 325 weapons by 1992 (in the re-unified Germany), and there are now estimated to be about 15 US nuclear weapons in Germany (Arkin and Norris 1992; Kristensen 2021a).

More broadly, the historical record and independent estimates suggest the United States stationed thousands of nuclear weapons in western Europe and in the Asia-Pacific (Arkin and Fieldhouse 1985; Arkin and Norris 1992; Arkin, Norris, and Handler 1998; Norris 1999; Kristensen and Norris 2017b). In some cases, many hundreds of nuclear weapons were transferred to or from host states within a year (see for example, Norris 1999). Figure 1 summarizes start and end times of US nuclear weapons deployments and those by the Soviet Union and United Kingdom.

More limited information is available on nuclear weapons belonging to other nuclear-armed states that were stationed abroad. The United Kingdom deployed nuclear weapons in Cyprus, Singapore and West Germany (Moore 2001). The Soviet Union deployed nuclear weapons in all Soviet Republics as well as in East Germany, Cuba, Czechoslovakia, Hungary, Poland, and Mongolia (Norris and Arkin 1991; Norris 1992; De Andreis and Calogero 1995; Fursenko and Naftali 1998; Handler 1999; Uhl and Ivkin 2001; Arbman and Thornton 2003; Čėsna, Avulienė, and Aliulis 2004; Fuhrmann and Sechser 2014, 2014a; Pałka 2018; Becz, Kizmus, and Várhegyi 2019). There is no comprehensive history available for the deployment and removal of nuclear weapons from host states.

### ***Removal of Soviet Nuclear Weapons from Cuba, 1962***

In 1962, the Soviet Union deployed nuclear weapons to Cuba. The history of this deployment can be reconstructed from archival sources, including a report by Lieutenant General Nikolai Beloborodov, head of the Soviet nuclear arsenal in Cuba (Beloborodov 1998). The first delivery took place on 4 October, and included a total of 99 nuclear weapons (Fursenko and Naftali 1998, 217; Savranskaya, Blanton, and Melyakova 2013). The United States detected the existence of R-12 missiles during a reconnaissance overflight on 14 October 1962. US president Kennedy was informed on 16 October, a date typically considered to be the beginning of the Cuban Missile Crisis. During the



**Figure 1.** Foreign deployment timelines for nuclear weapons belonging to the United States, the Soviet Union and the United Kingdom. The Soviet Union also deployed nuclear weapons in all Soviet Republics, not shown in the figure, because deployment start and end times could not be reliably determined. US and British nuclear weapons deployed to West Germany remained there after reunification with East Germany in 1990. The sources for the figure are cited in the text.

crisis, a second delivery of nuclear weapons arrived in Cuba and included 68 nuclear weapons (Fursenko and Naftali 1998, 247; Savranskaya, Blanton, and Melyakova 2013). On 27 October the Soviet Union agreed to remove its ballistic missiles including their nuclear payload from Cuba in exchange for the US refraining from invading Cuba.

After removal of the nuclear weapons was agreed, all nuclear weapons were returned to central storage in the Soviet Union by 25 December 1962 (Birjukov 2007). All transports of nuclear weapons to and from Cuba were by ship. From the agreement to remove the weapons to complete removal 59 days elapsed, and it took less than 90 days from initial deployment to complete removal.

### **Removal of Soviet Nuclear Weapons from East Germany, 1959 and 1991**

Even before nuclear weapons were shipped to Cuba, the Soviet Union briefly deployed intermediate range missiles as well as nuclear warheads in East Germany (the German Democratic Republic), with the Commander of the Group of Soviet Forces in Germany reporting to the Soviet leadership in May 1959 that the missiles were ready to use. Three months later, the weapons were gone, with the actual relocation carried out in a matter of weeks (Uhl and Ivkin 2001).

In the late 1960s, nuclear weapons again were deployed in East Germany along with deployments to other Eastern European countries; a total of about 3000 Soviet nuclear weapons were deployed in Eastern Europe (Norris and Arkin 1991). In 1989, the USSR announced withdrawal of 400 nuclear weapons from East Germany, and the removal by train was completed in June 1991, but this

transfer did not cover all the nuclear weapons in the country apparently (Yakovlev 2002). On 13 June 1991, Soviet Foreign Minister Alexander Bessmertnykh said there were still Soviet nuclear weapons in East Germany (Fisher 1991) and it was only on 31 August 1991 that Soviet Defense Minister Yevgeny Shaposhnikov announced that all Soviet nuclear weapons had been withdrawn from East Germany (TASS Russian News Agency 1991; Handler 1999, 38). It had taken about 80 days to remove the last batch of remaining Soviet nuclear weapons from East Germany.

### ***Removal of US Nuclear Weapons from Taiwan, 1974***

The United States deployed its first nuclear weapons in Taiwan in 1958. By 1961, at the end of the Eisenhower Administration, there were “about a dozen weapons” in Taiwan (Norris, Arkin, and Burr 1999). Initially, the deployment consisted of nuclear capable cruise missiles and US deployed bombs to be delivered with aircraft. There may have been 50–60 at the peak of the deployment. This came down to 20–30 weapons before all nuclear weapons were removed in 1974 (Norris 1999). On 27 May 1974 the Joint Chiefs of Staff issued the order to withdraw the remaining weapons (United States Joint Chiefs of Staff 1974). The *Commander in Chief Pacific Command History* for the year 1974 states that “All nuclear weapons from Tainan Air Base, Taiwan, were relocated to Clark Air Base in the Philippines. Permissive Action Link (PAL) recode had been completed by 19 July”. (United States Command History Branch, Office of the Joint Secretary 1975, 263). This suggests as many as 20–30 nuclear weapons were removed from Taiwan within 53 days or less after the direct order was given. An earlier National Security Council memorandum of 14 March 1974 discussed “Changes in U.S. force levels on Taiwan” (United States National Security Council 1974), however, due to continued classification, it is not clear whether the memorandum included a nuclear weapon removal order to be implemented within a specified date.

### ***Removal of Soviet Weapons from Hungary, 1988***

Soviet nuclear weapons may have been first stationed in Hungary in November 1961 (Becz, Kizmus, and Várhegyi 2019). In July 1987, the Hungarian government under Prime Minister Karoly Grosz requested that Soviet nuclear weapons deployed there be withdrawn (Bandy 1991). A bilateral agreement for removal was signed on 10 October 1988 and weapons removal was completed by 27 November (Becz, Kizmus, and Várhegyi 2019). A total of 548 nuclear weapons stationed in Hungary were removed by train in four separate transfers in November 1988, and by 1 December 1988 “the entire technical staff, all armament, training equipment, material assets, and all special weapons” had been removed (Becz, Kizmus, and Várhegyi 2019). From the October agreement to remove the nuclear weapons from Hungary to completion of the removal of the weapons and related personnel, the period was just over 50 days.

### ***Removal of US Nuclear Weapons from South Korea, 1991***

Similar to Taiwan, the United States deployed its first nuclear weapons in the Republic of Korea in 1958. The decision was potentially motivated by prior discussion on nuclear use in the Korean War. In South Korea, a large variety of weapons was deployed, including aircraft delivered bombs, artillery shells, short-range missiles and anti-aircraft missiles (Kristensen and Norris 2017b).

It is estimated that in 1991, approximately 100 nuclear weapons remained in the Republic of Korea – 60 were artillery shells, and 40 were B61 bombs (Kristensen and Norris 2017b). The Presidential Nuclear Initiative by President Bush included the removal of all artillery shells and nuclear strike bombs from the Pacific region. President Bush's Nuclear Weapons Deployment Authorization of 5 November 1991 (NSD 64) mandated the removal of US nuclear weapons from South Korea. On 18 December 1991 South Korean President Roh Tae Woo announced that all weapons had been removed from the country (Bulman 1991). In less than 45 days, the United States removed a number of nuclear weapons from South Korea similar to the total stockpile deployed today in Europe.

### ***Removal of US Nuclear Weapons from Greece, 2001***

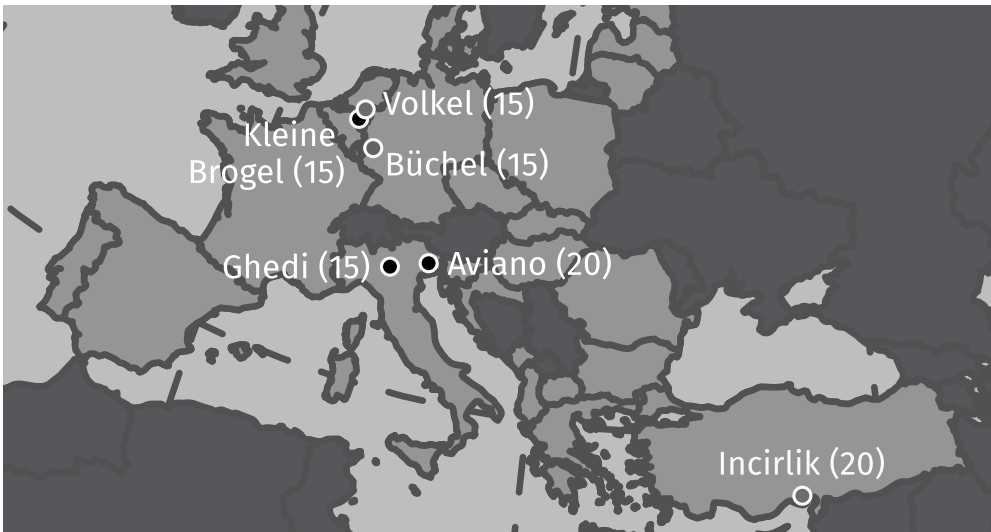
Greece, a member of NATO since 1952, began to host US nuclear weapons in October 1960 (Norris, Arkin, and Burr 1999). The US nuclear weapons stationed in Greece included aircraft-delivered bombs, artillery shells, short-range missiles and anti-aircraft missiles (Bulletin of the Atomic Scientists 1999). After the Cold War ended, all weapons except for bombs were removed as part of President Bush's Presidential Nuclear Initiative. The remaining weapons were stored at Araxos Air Base. In 1998, it was reported that 10 nuclear weapons remained (Arkin, Norris, and Handler 1998). The US weapons then deployed in Greece were B61 bombs. The 731<sup>st</sup> Munitions Support Squadron (MUNSS) was responsible for the nuclear weapons stored in Greece.

The 29 November 2000 Nuclear Weapons Deployment Authorization by President Clinton (PDD/NSC 74) initiated the complete removal of nuclear weapons from Greece. A total of “at least eleven nuclear warheads” were flown from the Araxos Air Base in Greece possibly on 15 January 2001 to Italy (Athens News 2001). Following the US presidential authorization, the total time for nuclear weapon removal was 47 days.

A subsequent order to inactivate the 731<sup>st</sup> MUNSS based at Araxos facility was issued on 23 March 2001 with the deactivation required to be completed on 20 June 2001 (United States Department of the Air Force 2001).

### **Removing US Nuclear Weapons from Current Host States**

As of March 2022 only the United States stations or deploys nuclear weapons in other countries. Weapons belonging to the United States are at six bases spread across five countries: Kleine Brogel in Belgium, Büchel in Germany, Aviano and Ghedi Torre in Italy, Volkel in the Netherlands, and Incirlik in Turkey. [Figure 2](#) shows the weapon



**Figure 2.** Map showing air force bases overseas hosting US nuclear weapons, with estimated nuclear weapon deployments as of October 2021 (Kristensen 2021a). Countries colored in light gray are NATO member states.

locations and the current estimated number of nuclear weapons at each site. The combined stockpile of US nuclear weapons at these six bases as of 2021 is believed to be about 100 nuclear weapons (Kristensen and Korda 2021).

The US weapons in the five host states are B61-3 or B61-4 nuclear bombs to be delivered by fighter aircraft (Kristensen and Korda 2021). The weapons are stored in underground vaults (the Weapon Storage and Security System), with each vault holding a maximum of four weapons and a number of such vaults available at each base (Kristensen 2015). The weapons are currently scheduled to be replaced with the upgraded B61-12 bomb, starting probably in 2022.

A Presidential Nuclear Weapons Deployment Authorization serves to regulate deployment of US nuclear weapons in host states. To initiate removal of weapons from a country, the US president would have to drop the country in subsequent Authorizations, or update an existing Authorization. This presidential directive would then be turned into operational instructions by the command chain of the US Air Force, which is in control of the nuclear weapons. Past experience suggests that the final physical removal of US nuclear weapons from a host state is followed by the deactivation and repatriation of the respective Munition Support Squadron or other US military personnel responsible for the weapons.

Host states are involved in the deployment and removal process as contractual partners under bilateral agreements with the United States. The Atomic Stockpile Agreements regulate introduction of weapons and their storage within the host nations, and establish arrangements for custody, security, safety, weapon release and cost sharing. These agreements are complemented by Atomic Cooperation Agreements on information exchange and Service-Level Agreements that regulate the technical implementation of the Stockpile Agreement (United States Department of Defense 1978; Kristensen



2005). The agreements are secret, and do not seem to have been debated or voted upon in respective parliaments. For example, in West Germany, the term “Atomic Stockpile Agreement” only occurs once in parliamentary records since 1949. It was part of an opposition party question to the government, which answered that all potential agreements with the United States regarding nuclear weapons would be secret (Deutscher Bundestag 2006).

Assuming a decision is made by a nuclear weapon host state to join the TPNW and agreement reached with the United States on the removal of nuclear weapons, the actual process of removal can be straightforward. The removal of the US nuclear weapons would be through airlifts back to the United States, or relocations to another host state or a new host state. All the sites at which US nuclear weapons are stationed in host states are air force bases. In the US Air Force, transports of nuclear weapons as cargo are conducted by the Prime Nuclear Airlift Force (PNAF). The 4<sup>th</sup> squadron of the 62<sup>nd</sup> air force wing carries out PNAF missions and is located at Joint Base Lewis-McChord in Washington State (Hemstreet 2009).

All PNAF missions now are flown by C-17 Globemaster III transport aircraft (Figure 3). The C-17 is authorized to transport B61-3 and B61-4 nuclear weapons (United States Secretary of the Air Force 2021). A single aircraft should be capable to transport all the nuclear weapons believed to be stored at any of the current US bases in Europe, except possibly Aviano in Italy and Incirlik in Turkey, which may need two C-17 flights to remove all the weapons believed to be stored there (Kristensen 2021b).

Publicly available US Air Force manuals give detailed descriptions of mission management, pre-departure and post-mission requirements, en-route operations and custody transfer procedures for regular missions and emergency nuclear airlifts (United States Secretary of the Air Force 2013a, 2013b). The Air Force also publishes some information on issues of safety and training procedures related to nuclear weapon airlift missions (United States Secretary of the Air Force 2018, 2021). Some technical details including for example the exact nuclear weapon loading capacity of a transport aircraft are not evident in public documents.



**Figure 3.** Left: Military personnel strap down a test nuclear weapon in a C-17 Globemaster III, 9 March 2009 (Source: US Defense Department photo by Benjamin Faske, <https://www.af.mil/News/Photos/igphoto/2000602126>). Center: Military personnel secure a “nuclear cargo training aid” inside a C-17 during a PNAF nuclear airlift mission training exercise, McChord AFB, 17 December 2008 (Source: US Air Force photo by Casey Collier, <https://www.mcchord.af.mil/News/Photos/igphoto/2000641009>). Right: Military personnel inspecting the “Command Disablement System”, a safety measure, on a US B-61 nuclear bomb on board a C-17 transport aircraft at Joint Base Lewis-McChord, 8 April 2021. (Source: US Air Force photo by Callie Norton, <https://www.mcchord.af.mil/News/Photos/igphoto/2002617692>).



The C-17 aircraft has an unrefueled range of 2400 nautical miles, about 4400 km (United States Air Force n.d.). During nuclear airlift missions, US safety procedures allow for aerial refueling (United States Secretary of the Air Force 2021). This would be sufficient for a direct flight from any the host state bases in Europe to Kirtland Air Force Base in New Mexico, where all B61 bombs are stored at Kirtland Underground Munitions Maintenance and Storage Complex (Kristensen and Norris 2014b). None of the current host states is landlocked, hence direct transports are possible without requiring additional overflight rights over neighboring countries. US Air Force manuals reference the classified “Special Weapons Overflight Guide” (AFI 16–610) for general restrictions on overflights (United States Secretary of the Air Force 2013b). Given the 11,100 km distance between Incirlik Air Base in Turkey (the furthest base from the United States) and Kirtland, the flight time for a direct flight would be about thirteen hours, depending on weather conditions. Shorter flight times are possible if weapons are moved to storage sites in other European countries that have adequate storage capacities and are not members of the TPNW.

There are some reports concerning flights that relate to nuclear weapon transports between European bases and the United States which offer additional details. In one case, a description of the event notes that a C-17 Globemaster transport aircraft carrying the tail-inscription McChord landed at the Volkel base in the Netherlands on 9 December 2020 and after about 24 hours took off and flew to Kirtland Airforce Base in the United States, and then flew back to Volkel, landing there on 12 December, only to take off again after four hours (Nassauer 2020). In another case, there are satellite images from 2017 and 2019 of a C-17 transport aircraft and signs of related possible nuclear weapons movement or exercises at the Incirlik base in Turkey (Kristensen 2019). Similar activity was reported at the Büchel base in Germany in August 2019 (Gebauer and von Hammerstein 2020). It seems plausible that these actions or exercises involved the removal or replacement of nuclear weapons stationed at the respective bases. The examples show that the loading and unloading of the nuclear weapons at these bases onto or from a transport aircraft for could be done within a day or two following the arrival of the aircraft.

The available evidence therefore suggests the physical removal of the 15 or 20 US nuclear weapons currently at any of the six bases in the five host states and their return to the United States could be done within a few days, including the time required for aircraft to fly from and return back to the United States. The repatriation of the respective US Air Force Munition Support Squadron charged with managing the nuclear weapons at the base could take longer.

## Conclusion

Over the course of the nuclear age, a handful of nuclear-armed states have transported to, stationed, and deployed large numbers of nuclear weapons in the territory of other states. Large numbers of weapons also have been returned from host states to the territory of the nuclear-armed states to whom the weapons belong.

An analysis of past removals (Cuba, East Germany, Taiwan, Hungary, South Korea, and Greece) suggests that while the time required to operationalize a decision to remove nuclear weapons may take a few months, the physical removal of the weapons can be done within a few days. Transport of nuclear weapons in such cases has taken place by ship and by plane across the world, and in some cases by train when there is a rail corridor from the host state to the nuclear-armed state to whom the weapons belong.

In March 2022, only five states host nuclear weapons belonging to another country, and in all these cases the nuclear weapons belong to the United States. The five host states could join the TPNW, ending their respective nuclear sharing arrangements, and remove the weapons. After the weapons have been removed, the associated US nuclear weapon support units would no longer be required and could be repatriated.

Although no simple standardized description is possible because of varying availability of information, evidence from historical cases involving the removal of nuclear weapons from host states, including Cuba, East Germany, Taiwan, Hungary, South Korea, and Greece suggests that even a stockpile of several hundred nuclear weapons can be removed out of a state's national territory and back to the nuclear-armed state to whom they belong or to another host state within a matter of a few months. For weapons belonging to the United States, a study of the cases of nuclear weapons removal from South Korea and Greece reveals that following a decision at highest level, i.e., a change in the Nuclear Weapons Deployment Authorization, the weapons were removed within 50 days.

The United States has well established procedures and regular exercises for the safe and secure transfer of nuclear weapons to and from host states. Given that the host states only have 15 or 20 nuclear weapons at each nuclear weapon base on their territory, the United States has sufficient nuclear airlift capacity to be able to carry out removal of all the weapons from any of the five host states with just one or two flights of its nuclear weapons transport aircraft. Removal of weapons could be managed within days.

A period of 90 days would seem sufficient time after the decision on nuclear weapon removal by a host state to allow the issuing of a US Presidential Nuclear Deployment Authorization mandating removal, the preparation of a specific operational plan for the removal of the weapons, and the physical transport of the weapons out of the territory of any of the current five nuclear weapon host states.

In summary, the TPNW article 4.4. obligations on nuclear weapon removal from host states could be fulfilled promptly within a matter of a few days and not later than a deadline of 90 days. As required by the treaty, once these weapons have been returned, the now-former weapon host state then could declare to the United Nations Secretary General that the nuclear weapons have been removed from its territory or any place under its jurisdiction or control.

## **Disclosure Statement**

No potential conflict of interest was reported by the author.

## Notes on Contributors

*Moritz Kütt* is a physicist and senior researcher in the Arms Control and Emerging Technologies project at the Institute for Peace Research and Security Policy at the University of Hamburg (IFSH). He has been a postdoctoral researcher and a visiting researcher at Princeton University's Program on Science and Global Security.

*Zia Mian* is a physicist and co-director of Princeton University's Program on Science and Global Security, which is part of the Princeton School of Public and International Affairs. He is co-author with Harold Feiveson, Alexander Glaser, and Frank von Hippel of *Unmaking the Bomb: A Fissile Material Approach to Nuclear Disarmament and Nonproliferation* (MIT Press, 2014).

## ORCID

Moritz Kütt  <http://orcid.org/0000-0002-1946-6455>

Zia Mian  <http://orcid.org/0000-0002-0802-2306>

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