The Cuban Missile Crisis:

A Nuclear Order of Battle

October/November 1962

by

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There is general agreement that the Cuban Missile Crisis of October 1962 is the closest the world came to nuclear war.[1] To commemorate the 50th anniversary new books, articles and reminiscences will no doubt be forthcoming. One contribution to the vast literature would be a full accounting of the numbers and types of U.S. and Soviet nuclear weapons that were operational during the period from mid-October through November 1962, a nuclear order of battle.[2] Most accounts of the crisis mention certain weapon types but leave others out and the tally is incomplete.

The basic facts about Cuban Missile Crisis are well known and there is an extensive literature. The crisis began in mid-October 1962 when the United States discovered that the Soviet Union was secretly deploying medium-range ballistic missiles into Cuba. The U.S. had been aware that the Soviet Union was providing increased military assistance to Cuba since late July, but ballistic missiles crossed the line.

On October 14, a Strategic Air Command U-2 aircraft overflying western Cuba took photos that revealed that bases were being readied and missiles prepared. These conclusive facts were provided to the president's advisers and President Kennedy was shown the "hard photographic evidence" at 8:45 am on Tuesday October 16.

In the days that followed committees were formed, plans proposed, and U.S. military forces were put on higher stages of alert. On Monday October 22, in an address to the nation, President Kennedy described his course of action. This included a "strict quarantine on all offensive military equipment" under shipment to Cuba, to go into effect on October 24. Underscoring the gravity of the crisis, and as a warning to the Soviet Union, President Kennedy said that the United States will "regard any missile launched from Cuba against any nation in the Western Hemisphere as an attack by the Soviet Union on the United States, requiring a full retaliatory response against the Soviet Union."

Tension mounted over the next days. At the same time diplomatic communications and an exchange of letters between Premier Khrushchev and President Kennedy ensued eventually leading to a resolution of the crisis. On Sunday October 28, Premier Khrushchev agreed to dismantle the offensive

weapons in Cuba and return them to the Soviet Union subject to United Nations verification. The United States agreed not to invade Cuba and in a secret agreement said it would remove its Jupiter missiles from Turkey.

The crisis did not end suddenly after the thirteen-day period from October 16th to 28th when Khrushchev agreed to withdraw the missiles.[3] A new phase of the crisis ensued, virtually out of sight, with a great deal unknown to the Americans.

Though less tense the month of November saw its share of concerns, (the issue of removing the IL-28 bombers being among the most serious), and U.S. forces were only gradually wound down. For example, the Strategic Air Command remained at DEFCON II until November 21 and only returned to DEFCON IV, its normal readiness condition, on November 27. The dispersed B-47s did not return to their bases until November 24. On October 22 Pacific Command Quick Reaction Alert aircraft were loaded with nuclear weapons and readied for immediate launch. They remained at that alert status until November 1.

On November 21 the USSR announced seven measures to reduce military readiness, effective immediately. The first was that "intercontinental and strategic rocket troops are to shift from full (or total) combat readiness to normal combat training and activity".[4]

From October 29 on was the nagging question of whether the Soviets were enough trustworthy to remove their weapons or were they engaged in a "massive trick" or "a gigantic hoax," to use Dean Rusk's description? Impending mid-term elections were days away and were definitely on Kennedy's mind. How to respond to the presses' voracious appetite and control the narrative was a constant problem. Many questions remained unanswered: was Khrushchev indulging in word games by his use of "offensive" and "defensive" weapons, might they lie again, as Gromyko had done earlier to the President, how could there be effective verification that the weapons, warheads and personnel were leaving? Would U.S. high-level U2s or other low-level reconnaissance aircraft be shot down by Cuban or Soviet air defense?

Castro and the tactical nuclear weapons

The role of the tactical nuclear weapons in Cuba was a key topic in a tense four hour exchange on November 22d among Fidel Castro, his associates and

Soviet Deputy Prime Minister Anastas Mikoyan.[5] The original plan was to leave the tactical nuclear weapon in Cuba as part of a Soviet presence. There was a second part of the plan that the Soviets would transfer the FKRs and Lunas to Cuba, thus making it the first nuclear power in Latin America. Apparently in the initial phase the Soviets would turn over the launchers and missiles to the Cubans and train them while retaining custody of the warheads much as the Americans did with her NATO allies and at some future date transfer the warheads to the Cubans as well!

For a period of ten days or so after Khrushchev's agreement of October 28 to remove the ballistic missiles the Soviets continued their plan to leave the tactical nuclear weapons in Cuba under their control, since the weapons had not been part of any agreement (and were not even known about by the Americans). But it became clear to Khrushchev (and to Mikoyan) that Castro might not be as responsible a custodian of Soviet nuclear weapons as one would have liked and that the original plan would have to be reversed. At the same time the issue of removal of the 42 Il-28s had to be faced. To deal with the delicate diplomatic matters of informing Castro about, why the ballistic missiles were being removed, why the Il-28s had to be withdrawn and, as negotiations revealed, why the tactical nuclear weapons had to be removed, as well, Khrushchev sent Anastas Mikoyan who arrived in Havana on November 2. The Soviet Deputy Prime Minister accomplished his difficult tasks while maintaining friendship with its socialist ally in the Western Hemisphere. For this, as Svetlana Savranskaya argues, Mikoyan should be given credit for helping to end the Cuban crisis.[6]

The extraordinary details are recounted in *The Soviet Cuban Missile Crisis: Castro, Mikoyan, Kennedy, Khrushchev and the Missile of November* by Sergo Mikoyan and Svetlana Sarranskaya. This is clearly the most important new information to come out about the Cuban crisis and demonstrates that there is still much to be known about it.

On November 30 the tactical nuclear weapons were loaded aboard the *Arkangel'sk* and the ship sailed for home on December 1st,[7] arriving in the USSR on December 20th. Earlier on November 5, the *Aleksandrovsk* departed Cuba with the 24 warheads for the SS-5 IRBMs (that had never been unloaded), and the 36 SS-4 warheads.

There was continuing concern by the Defense Intelligence Agency about the quantitative and qualitative increase of Soviet conventional weapons to Cuba that left Castro with a formidable military capability.[8]

The nuclear order of battle includes available/operational weapons, some on high levels of alert, which were ready to be used if authoritative orders had been given. The nuclear weapons were of many different types depending on their range, yield, location and delivery mode. While it is evident that Kennedy and Khrushchev had no intention of starting a nuclear war, and did everything they could to prevent one, events occurred that they and their advisers did not know about or control. As the crisis unfolded there was the possibility of weapons being launched by mistake, miscalculation or misjudgment. Once one nuclear weapon had been used it is difficult to say where it might have ended.

Much was not known or understood at the time. On both sides there was incomplete intelligence leading to mistaken analysis and/or false conclusions.[9] Only decades later would some of the most basic facts be revealed. There have been a series of conferences attended by US, Russian, and Cuban participants.[10] These exchanges, coupled with additional disclosures of authoritative documents, revealed unsettling dimensions of the crisis. For example, American officials, including Secretary of Defense, Robert McNamara, did not believe that the nuclear warheads for the Soviet weapons had arrived. In fact, by the time of the quarantine most had arrived and were already in Cuba. After a 19-day trip from *Severomorsk* the cargo ship, *Indigirka* arrived on October 4th at Mariel and unloaded 90 warheads for four weapon systems. Thirty-six of the warheads were for the SS-4 MRBMs and were kept in vans parked near the missile sites. On October 23 another 68 warheads arrived at the port of Isabella. Had there been verification of the presence of dozens of warheads for the tactical systems it may have complicated the outcome of the crisis.

War might have started in a variety of ways: by accident or through false warning, even deliberately. One of the more likely scenarios involves Soviet use of one or several nuclear weapons to attack American armed forces invading Cuba. In a 1992 conference, and later in a 1994 book, it was revealed that there were tactical nuclear weapons in Cuba. While there is a difference of opinion about whether Khrushchev delegated authority to the local General to use them or not,[11] the fact is that they were there, the Americans did not know about them and if pressured desperate Soviet soldiers might have fired them had an invasion ensued.

The Soviets divulged that the Soviet general in Cuba had been delegated authority by Moscow to use tactical nuclear weapons if the United States were to conduct an amphibious invasion of the island and contact was lost with Moscow. American officials up until then knew nothing about the presence of tactical nuclear weapons in Cuba, much less about any pre-delegation orders to use them. Premier Khrushchev rescinded the pre-delegation order after President Kennedy went on TV on the evening of October 22 to announce the presence of offensive missiles in Cuba.

On the U.S side prior to public disclosure of the missiles in Cuba there were invasion plans being prepared and promoted by various generals. Later more concrete invasion plans were prepared to be undertaken on October 28 if Khrushchev did not reply positively by then. If those plans had gone forward there would have likely been a very different outcome to the crisis, possibly the use of nuclear weapons in and around Cuba, which could have rapidly escalated to further exchanges, perhaps even to global nuclear war using strategic weapons.

The crisis occurred at an early stage of the arms race when each side's forces were still relatively immature. This was probably beneficial in the outcome which averted war. The forces on the American side were configured for deterrence or war fighting with safety a secondary objective.[12] There was not yet the inherent coupling that would occur when U.S. and Soviet forces attained rough levels of parity.[13] At this later, more dangerous stage, when forces were tightly coupled, something (either accidental or deliberate) may have triggered higher stages of alert and a cascading effect may have overwhelmed the system. Logical, prudent and conservative measures taken by officials in response to the actions of each other may have resulted in the outbreak of war.

Much needs to be known about Soviet alert levels during the crisis. On October 23, "the USSR announced deferment of release of troops in the Strategic Rocket Forces, PVO and submarine fleet, cancellation of all leaves, and orders to 'raise the battle readiness and vigilance of all troops." On the same day Marshall Grechko ordered representatives of the Warsaw Pact to "carry out several measures in increasing the military preparedness" of Pact forces.[14]

On October 25, *Red Star* carried portions of a speech by Marshall Rodion Malinovsky emphasizing the power of Soviet missiles. It defined "highest combat

readiness" as the ability to bring the might of the armed forces, at the first signal, 'into immediate action against the enemy, his strategic military, economic and political centers and main concentration of forces."[15]

The Nuclear Order of Battle is organized into three categories:

* Global forces: Those U.S. strategic nuclear weapons (ICBMs, SLBMs and long-range bombers) that could reach the Soviet Union and the USSR strategic nuclear weapons that could reach the United States that would have been involved a global nuclear war.

* Regional forces: Those U.S. weapons in Europe that could hit targets in the Soviet Union and Soviet weapons in the western USSR aimed at European targets that would have been involved a regional nuclear war. British and French weapons are excluded.

* Local forces: Those Soviet and U.S. nuclear weapons in and around Cuba that would have been involved a local nuclear war.

What follows is an Order of Battle of nuclear forces that were available to military and civilian officials on both sides from mid-October through November 1962 and some scenarios of how they might have been used and with what consequences.

I. U.S. and Soviet Strategic Forces and Global Nuclear War

If nuclear weapons had been used in or around Cuba or launched from Cuba the possibility of escalation was high with regional use likely and the use of strategic weapons a serious possibility. President Kennedy said as much in his October 22 address to the nation. "It shall be the policy of this Nation to regard any nuclear missile launched from Cuba against any nation in the Western Hemisphere as an attack by the Soviet Union on the United States, requiring a full retaliatory response upon the Soviet Union."

That the crisis could get out of hand was clearly on their minds. At one point former Secretary of State Dean Acheson advised that we should knock out

the Soviet missiles in Cuba. Someone asked what would the Soviets do in response? Acheson replied, "I know the Soviet Union well. I know what they are required to do in the light of their history and their posture around the world. I think they will knock out our missiles in Turkey."
"Well, then what do we do?" Another queried.
Acheson replied, "Under our NATO treaty, with which I was associated, we would be required to respond by knocking out a missile base inside the Soviet Union."
Came the inevitable question: Then what would they do?"
Acheson paused. "That's when we hope," he answered, "that cooler heads will prevail, and they'll stop and talk."[16]

The fear of inadvertent escalation with events spinning out of control was clearly a key factor in the efforts to resolve the crisis, especially on the Soviet side. Khrushchev's letter to President Kennedy of October 26 revealed his fears about the "calamitous nature of modern warfare. He warned the American president that 'should war indeed break out, it would not be in our power to contain or stop it, for such is the logic of war. I have taken part in two wars,' he reminded Kennedy, 'and I know that war ends only when it has rolled through cities and villages, sowing death and destruction everywhere.'"[17]

U.S. strategic forces were many times larger and more reliable than Soviet strategic forces in October and November 1962. As detailed below, a large scale attack by the United States against the Soviet Union in October 1962 would have been with over 3500 ("fully generated") nuclear weapons, with a combined yield of approximately 6300 megatons. This was about half of the number of warheads with U.S. strategic forces, most of which were bomber weapons for long-range bombers. The total number of nuclear weapons in the U.S. Stockpile in October 1962 was approximately 26,400 and the Soviet Union approximately 3300.[18]

The Soviet Union had approximately 42 ICBMs capable of reaching the United States, no SLBMs, and a long-range bomber force of 160 Bear and Bison bombers that would have had to face a formidable U.S. – Canadian air defense system of fighter interceptors with nuclear air-to-air missiles, BOMARC and Nike

Hercules surface-to-air missiles. General Gribkov stated that Khrushchev and his military advisers "knew . . . that U.S. strategic nuclear forces outnumbered ours by approximately 17 to 1 in 1962". [19]

To further support the estimate of some 3500 U.S. warheads let us examine Secretary of Defense Robert McNamara's draft Memorandum to the President, dated November 21, 1962, which has the Secretary's recommendations for FY 1964-FY 1968 Strategic Retaliatory Forces. Included is a Table showing 1512 Alert Force Weapons with a total yield of 2710 megatons for the end of FY 1962 (30 June 1962). This calculates to an average yield of 1.8 megatons per weapon. The JCS Table, as part of SIOP-62, dated 15 July 1961 has 1530 Alert Force Weapons, quite close.[20] If we extrapolate, to estimate what the forces might be in SIOP-63, it is reasonable to conclude that 3500 fully generated weapons have a combined yield of some 6300 megatons. To add further support for this estimate, the Table shows that at the end of FY 1968 there are 3568 alert force weapons with a combined yield of 6577 megatons. Unleashing a retaliation of this massive amount surely would have left the Soviet Union, "a smoking, radiating ruin at the end of two hours."[21]

On November 4, 1962 SAC reached its maximum strength during the crisis with 2,962 nuclear weapons. If the 3500 total is approximately correct then there were slightly more than 500 non-SAC weapons in the SIOP provided by Atlantic Command (112), Pacific Command (~200) and European Command (~250).

*Atlantic Command contributed seven SSBNs with 112 warheads.

*Pacific Command provided eight Regulus missiles, 16 Mace missiles, three aircraft carriers (assumes 40 bombs per carrier), and land-based aircraft on QRA and on alert (50 bombs).

*European Command provided 105 Thor and Jupiter missiles, 48 Mace missile warheads, two Sixth Fleet aircraft carriers within range (the FDR and Forrestal in the eastern Med - assumes 40 bombs per carrier) and U.S./NATO

fighter bombers on QRA and on alert at US and NATO bases in Europe (50 bombs).

II. A Regional Nuclear War in the European Theater

Nuclear weapon systems on both sides were available in and around Europe and could have been employed if escalation had occurred. If the nuclear exchanges were confined to Europe and the western part of the USSR the numbers of weapons were approximately equal, a scenario unlikely at the time since Atlantic Command and European Command forces were part of the SIOP. Nevertheless, it is instructive to estimate Europe's possible role in the crisis and the destruction that might have ensued. Medium-range and intermediate-range missiles and fighter bombers made up US/NATO and Soviet regional forces in the European theater.

U.S./NATO weapons facing east. In 1962 the U.S. had approximately 4375 nuclear weapons deployed in Europe.[22] Most were tactical nuclear weapons (e.g., 155 mm and 203 mm artillery shells, Nike Hercules SAMs, land mines and short-range missiles) intended for the nuclear battlefield. But roughly ten percent or so, about 450 nuclear weapons, were for ballistic missiles (Thor and Jupiter), cruise missiles (Matador and Mace), and bombs for Air Force fighter-bombers at US/NATO bases and Navy carrier-based planes within range to hit targets in the Soviet Union or Warsaw Pact nations. The U.S. and NATO fighter bombers had a supply of nuclear bombs deployed at bases in Germany, Italy, Greece, Turkey, the United Kingdom and the Netherlands and aboard for U.S. Sixth Fleet aircraft carriers.[23] The Air Force and Navy planes would have had to contend with a formidable Soviet air defense system on their way to targets in the Soviet Union.

Soviet weapons facing west. In 1962 **t**he Soviet Union had over 550 SS-4s and SS-5s.[24] Many were likely aimed at European targets with a portion targeted on U.S. bases and U.S. allies in the Pacific region. Soviet fighter bombers based near the western border of the Soviet Union may have had missions to hit targets in Western Europe.

In sum, there were approximately 500 nuclear weapons available to the United States to attack targets in the western USSR and a slightly higher number of Soviet nuclear weapons that would have hit European targets with catastrophic results.

III. A Local Nuclear War in and around Cuba

Initial use of a nuclear weapon might have begun in and around Cuba. The most likely scenario would have been use of Soviet tactical nuclear weapons to attack and repel American forces during an invasion of Cuba. If American soldiers were killed, as they surely would have been, the United States would have had to retaliate and more than likely the Soviets would have responded.

A most dire situation for the United States would have been the launching of SS-4 MRBMs to American cities within its range of 1300 statute miles. According to Major General Igor Stastenko, commander of the Soviet missile troops on Cuba, there were only six to eight missiles operational on October 28, when the dismantlement order from Moscow arrived. We do not know precisely how ready they were or whether they were specifically targeted at American cities. Cities along the eastern seaboard as far north as Washington, DC were within range as were New Orleans, Houston, and Dallas to the west and Cincinnati to the northwest. Even with its poor accuracy a one megaton detonation in or around those American cities would have caused hundreds of thousands of deaths.

We do not know what role nuclear weapons played in various OPLANS that were outlines to be used to invade Cuba. The majority view within the American military was that conventional forces were probably adequate to attack and destroy Soviet forces on Cuba without the use of nuclear weapons.[25]

Appendix A: United States Strategic Forces

i. U.S. ICBMs

The SAC alert buildup reached a peak at 1400Z on November 3 with 182 ICBMs in operational status.[26] The number fluctuated daily (even hourly) from October 22 to November 20, rising from 132 to 182 and then decreasing to 150, depending upon such things as the supply of liquid oxygen fuel and maintenance issues. According to the SAC history on November 3rd there were 121 Atlas D/E/F ICBMs, 53 Titan 1 ICBMs, and 8 Minuteman 1A ICBMs. Included are the nine ICBMs at Vandenberg AFB, deployed in test/training facilities, which attained an emergency launch capability and were added to the SIOP force, targeted at the "Sino-Soviet Bloc."

a. Atlas D, E, and F ICBM[27]

121 Atlas D (24), E (27) and F (70) deployed at nine Air Force Bases
One Atlas F achieved EWO status at Vandenberg AFB (see below).

Atlas D: 15 at F.E. Warren (2 Sep 60 and 7 Mar 61)
9 at Offutt (30 Mar 61)
Range: 6,325 miles
Warhead: 1 W49Y2 (1.45 MT)
Horizontal "soft" above ground launcher, raised to a vertical position for firing

Atlas E: 9 each at Fairchild (28 Sep 61) Forbes (10 Oct 61), and F.E. Warren (20 Nov61)
Range: 7,800 miles
Warhead: 1 W38Y1 (4.5 MT)
Horizontal semi-hard concrete coffin launcher, 25 psi

Atlas F: 12 each at Schilling (9 Sep 62), Lincoln (15 Sep 62), Altus (9 Oct 62) and Dyess (15 Nov 62) and 6 (of an eventual 12) at Walker (30 Nov 62) and 10 (of an eventual 12) at Plattsburgh (20 Dec 62).
Range: 7,800 miles

Warhead: 1 W38Y1 (4.5 MT)
Vertical silo-lift launcher

During the missile crisis the 12 missiles at four (of six) Atlas F bases were put on alert.[28] Six Atlas Fs at Walker AFB, NM and ten at Plattsburgh AFB, NY were at the time under Air Force Systems Command (AFSC) control but were designated under the AFSC/SAC Agreement to be transferred to SAC and readied for EWO firing. The number of ICBMs being placed on alert increased daily and by 20 December 1962 SAC declared the 556th SMS at Plattsburgh operational competing deployment of the Atlas ICBM force.

Vandenberg Atlases: On October 24, SAC invoked the Air Force Systems Command AFSC/SAC Agreement for Emergency Combat Capability (ECC) of Ballistic Missile Launch Complexes. This meant placing the test missiles at Vandenberg in a war ready posture and turning them over to SAC control.

Of the twenty ICBM launchers at Vandenberg, AFB eleven were for Atlas missiles, three were for Titan missiles and six were for Minuteman missiles. By October 30 crews had placed warheads on nine missiles in nine launchers:[29] one Atlas F, three Titan Is and five Minuteman I ICBMs.

3 Atlas D (576-A-1-2-3) above-ground gantry - left in test posture

3 Atlas D (576-B-1-2-3) above-ground coffin

1 Atlas E (576-C) buried coffin

1 Atlas F (576-D) hard silo-lift

1 Atlas F (576-E) hard silo-lift

1 Atlas E (576-F or OSTF 1) –

1 Atlas F (576-G or OSTF 2) – achieved EWO at 0108 on 24 October and returned to test status on 1 November 1962. It was launched on 14 November 1962.

AFSC launched an Atlas D (code named “Closed Circuits”) from 576-A-1 on 26 October 1962 at 0400 hours.[30]

b. Titan 1 ICBM[31]

Between 18 April and 28 September 1962, 54 Titan 1 ICBMs were placed on alert, in six squadrons at five Air Force Bases. In addition there were three Titan 1s that attained an emergency launch capability at Vandenberg AFB.

1. Lowry AFB, CO (April 18, 1962) – 9 ICBMs (724 SMS)
2. Lowry AFB, CO (May 10, 1962- 9 ICBMs (725 SMS)
2. Mountain Home AFB, ID (August 16, 1962) – 9 ICBMs (569 SMS)
3. Beale AFB, CA (September 8, 1962) – 9 ICBMs (851 SMS)
4. Ellsworth AFB, SD (September 28, 1962) – 9 ICBMs (850 SMS)
5. Larson AFB, WA (September 26, 1962) – 9 ICBMs (568 SMS)

Range: 6,400 miles
Warhead: 1 W38 Mod 0 (4.5 MT) warhead
Vertical silo-lift launcher

Vandenberg Titans: There were three Titan 1 Launch Emplacement facilities at Vandenberg (395A-1-2-3)

LE2 (395A-2) – achieved EWO status October 24

LE1 (395A-1) – achieved EWO status by 23:59 October 27

LE3 (395A-3) – achieved EWO status by 23:59 October 27

c. Minuteman 1A ICBMs:
Range: 7,250 miles
Warhead: W59Y1 (1 megaton)
Launcher: hardened silo

At the peak of the crisis on October 27, 1962 the first two Minuteman 1A ICBMs were placed on alert at Malmstrom AFB, Montana.[32] By the next day four were on alert at Malmstrom and two days later there were nine. They continued to be fielded over the next days and weeks and by December 11 twenty were on alert at Malmstrom.[33] By the end of the year almost 200 of the three types of ICBMs (Minuteman, Titan, Atlas) were operational.

Vandenberg Minuteman: There were six Minuteman 1A launch facilities at Vandenberg, AFB. Five were made war-ready to be launched at enemy targets. Two missiles were placed on strategic alert on October 27 (LF-3 at 0900 and LF-4 at 2400), a third on October 29 (LF-5), and two more on October 30 (LF-1 and LF-2 at 0922).

On October 23 SAC combat crews replaced AFSC and civilian contractor personnel, targets were programmed into the systems and nuclear warheads replaced test reentry vehicles.

Because of maintenance required on the guidance and control section the Minuteman in LF-2 was taken off strategic alert on November 1 and the Minuteman in LF-3 on November 2. "On 4 November 1962, Ballistic System Division and Strategic Air Command agreed to return all AFSC missiles to a testing posture. Strategic Air Command remained in DEFCON II while AFSC remained in DEFCON III status."[34]

According to Ray S. Cline, President Kennedy was told that the United States "had at least a four-to-one advantage in ICBMs and perhaps an eight-to-one superiority in nuclear weapons capability if our powerful bomber aircraft force of that era were entered into the equation. The actual ratio probably was even more heavily in our favor."[35]

As mentioned above General Gribkov stated that Khrushchev and his military advisers "knew . . . that U.S. strategic nuclear forces outnumbered ours by approximately 17 to 1 in 1962".[36]

Cline was approximately correct. For ICBMs with a peak of 182 for the U.S. and 42 for the Soviet Union the ratio was 4 to 1. Gribkov's ratio is a little high with some 3500 US warheads versus about 300 Soviet warheads.

On October 24 the AFSC/SAC Agreement for Emergency Combat Capability (ECC) of Ballistic Missile Launch Complexes was executed for the first time. Over the next month Thirty-six AFSC missiles were turned over to SAC and placed on alert.[37]

ii. U.S. Ballistic Missile Submarines (SSBNs/SLBMs)

Less is known about the availability of U.S. SSBNs during the months of October and November 1962. Six SSBNs had undertaken their initial operational patrols by the time of the crisis:
George Washington, SSBN 598: (11-15-60)/A1
Patrick Henry, SSBN 599: (12-30-60)/A1
Robert E. Lee, SSBN 601: (05-02-61)/A1
Theodore Roosevelt, SSBN 600: (07-19-61)/A1
Abraham Lincoln, SSBN 602 (08-27-61)/A1
Ethan Allen, SSBN 608 (06-26-62)/A2

The seventh, the *USS Sam Houston* (SSBN 609) departed Charleston, SC on October 10, 1962 to go on operational patrol with 16 Polaris A-2 missiles in the middle of the crisis. The eighth, the *USS Thomas A. Edison* (SSBN 610), departed Charleston, SC on November 7, 1962 to go on operational patrol with 16 Polaris A-2 missiles.

Holy Loch

In order to be within range of the Soviet Union the United States established a submarine base in Holy Loch, Scotland for a squadron of ballistic missile submarines.[38] Fleet Ballistic Missile Submarine Refit Site One, at Holy Loch, housed the 14th Submarine Squadron (SUBRON 14). The likely patrol areas were the Norwegian Sea and the eastern Mediterranean.[39]

The first five *George Washington* class submarines (SSBN 598) arrived at Holy Loch between March and October 1961 and began their patrols of approximately 65 days.[40] Each submarine had a Blue and Gold crew that flew back and forth from Charleston, SC. Between patrols there was a 25-30 day period where repairs were made and supplies were put aboard. The first five submarines carried the Polaris A1 ballistic missile with a range of 1200 nm (1380 miles).[41] The next two submarines to deploy, SSBN 608 and SSBN 609, carried the Polaris A2 ballistic missile with a range of 1500 nm (1725 miles).

According to the Commander of the *Robert E. Lee*, "The USS Robert E. Lee (SSBN 601) was one of the three SSBNs on patrol in October, 1962 at the time of the Cuban Missile Crisis and I was in Command."[42]

VADM Griffiths goes on to say, "Back in the Holy Loch simultaneously with the setting of the higher DEFCON [October 22] all hands worked at a frantic pace to get the two submarines alongside to sea. Both were undergoing repairs to pumps, motors, electronics and weapons, as well as loading of supplies. In the case of USS Abraham Lincoln (SSBN 602) a load out of several torpedoes was involved. Incredible as it may seem, both ships were underway and clear of The Holy Loch within a span of 24 hours."[43]

Another source, apparently with access to official records, states: "By mid-October six of the Navy's new Polaris submarines, based at Holy Loch Scotland had deployed to their battle stations deep under the sea. USS Abraham Lincoln (SSBN 602), in upkeep at Holy Loch, and two other submarines that had just completed shakedown cruises were also prepared on short notice to add their firepower to the nuclear equation.". . . " On October 22 at 1900 at DEFCON 3 "Polaris submarines moved to their launch points."[44]

The normal DEFCON 5 Polaris alert level was three SSBNs (48 SLBMs). With the alert raised to DEFCON 3 on October 22, seven SSBNs with 112 Polaris SLBMs were on alert.[45] Of the seven SSBNs five carried Polaris A-1 SLBMs and two carried Polaris A-2 SLBMs. Each of the 112 SLBMs had a single warhead.

Frigate Bird: The submarine *USS Ethan Allen* (SSBN-608) launched a Polaris A2 missile on May 8, 1962, while submerged, about 155 nautical miles east northeast of Christmas Island in the Pacific Ocean. The re-entry vehicle/warhead traveled about 1020 nm toward the island, detonating as an airburst at an altitude of about 8300 feet, 125 miles from the nominal aim point. The yield of the W47Y1 warhead on the Polaris A2 SLBM was not announced but is estimated to be 600 Kt. Shot *Frigate Bird* was the first and only operational test of a U.S. SSBN/SLBM weapon system. Clearly the Soviets took notice of this event and the

flurry of tests conducted by the U.S. from April to June in the Pacific. The *Ethan Allen* returned to Charleston via the Panama Canal, and departed on patrol on June 26, 1962 with 16 Polaris A-2 missiles arriving at Holy Loch at the end of August 1962.

Once again Commander Griffiths, "The Soviets kept a trawler (AGI), equipped for electronics and communications surveillance, stationed close enough to the Holy Loch to keep track of traffic in and out of the port. Most certainly the Soviet High Command knew there were five SSBNs within range of targets in the Soviet Union with 80 nuclear weapons on board. This must have given the Soviet leadership food for thought. To add to their concerns the AGI would have reported that Holy Loch was now empty since Proteus, tender to the submarines, was also at sea."[46]

Regulus I sea-launched cruise missile

Range: 300-575 miles

Warhead: 1 Mk 5 (10-45 kt) or 1 W27 (2 megaton)

Prior to introduction of Polaris ballistic missile submarines in the Pacific Fleet at the end of 1964[47] Regulus cruise missile submarines were the only submarines to conduct deterrent patrols in the Pacific. The submarines needed to surface to launch their missiles and thus were far more vulnerable than the ballistic missile submarines that soon replaced them. Five submarines carried the Regulus I missile from 23 October 1959 to 14 July 1964: four converted diesel submarines: *Tunny* (SSG-282), *Barbero* (SSG-317), *Grayback* (SSG-574), *Growler* (SSG-377) and one nuclear-powered submarine, *Halibut* (SSGN-587).

Normally one or two submarines were continuously on patrol in the North Pacific within range of targets in the Soviet Far East. Installations on the Kamchatka Peninsula, notably the Soviet Pacific Fleet were priority targets. Depending upon which submarines were on station between two and nine missiles were available to be fired at any given time.

During the Cuban Missile Crisis the USS *Tunny* carrying two Regulus I missiles, went to "Battle Stations Missile" and went through preliminary launch procedures. The order to "Surface" to launch her missiles never came and she

returned from patrol on 29 October 1962.[48] A second submarine, the USS *Barbero* was also on patrol and also carried two Regulus I missiles. Its patrol lasted from 24 August 1962 to 29 October 1962.[49] The *Grayback* carrying four missiles was sent to relieve them, leaving port on October 7, on its sixth patrol, and when reaching its patrol area pre-armed the warheads. "The last action would have been to flip the arming switch and the warhead would have been ready for launch."[50] That step was not taken and the *Grayback* returned to Pearl Harbor on December 22, 1962. The *Growler* remained in Pearl Harbor. The three submarines on station had a total of eight Regulus missiles within striking distance of the Soviet Union. When ordered to DEFCON 2 they prepared the nuclear warheads for arming and, if necessary, for launching the missiles. The submarines remained on alert for two weeks.

The Single Integrated Operational Plan: SIOP-63 and SIOP-62

SIOP-63 came into effect on August 1, 1962. It was briefed to the President on September 14, 1962 one month before the start of the Cuban missile crisis.[51] SIOP-62 had come into effect April 15, 1961 and had been briefed to the President on September 13, 1961. SIOP-62 was the first nuclear war plan under the new arrangement of coordinating all commands through the Joint Strategic Target Planning Staff to have a Single Integrated Operational Plan (SIOP) and coordinate the nuclear targeting plans of all commands so as to avoid duplicative attacks.[52]

Much about the SIOP remains classified, but significant information about SIOP-62 is available. SIOP-62 has been declassified and provides details of what forces would have been employed at the time, the kinds of targets they would have destroyed, and presumably what knowledge President Kennedy had of the war plan as a result of the briefing.

Over 3500 nuclear weapons were assigned to some 1200 Designated Ground Zeroes (DGZs), some of which covered several installations ("target islands"). Because of complaints about the rigidity and overkill of SIOP-62, the successor plan included five instead of just one basic option, and there were

attempts to distinguish between civilian and military targets. Nevertheless, if the President faced "the moment of thermonuclear truth," to use McGeorge Bundy's phase, his only options were, in effect, massive nuclear strikes.[53] SIOP-63 allowed for several "withhold" options and made some attempt to distinguish between civilian and military targets. But in general SIOP-63 was quite similar to SIOP-62 in unleashing massive strikes with even more weapons available.

According to the JCS U.S. strategic nuclear forces on July 15, 1961, fully generated, numbered 3,267 weapons,[54] vastly more that the fledgling Soviet strategic forces. A memo drafted for General Maxwell Taylor some seven weeks later describes SIOP-62. "In 28 hours the full force of some 2300 vehicles [missiles and bombers] carrying about 3400 weapons can be launched."[55]

"The target list included 3729 individual installations, many of which were co-located so as to be included in a single Designated Ground Zero (DGZ). The plan had 14 to 16 attack options, all based on the amount of alert time available. With 15 minutes warning, 1004 delivery systems, carrying 1685 weapons yielding some 2100 megatons, were to be launched against more than 650 DGZs in the Sino-Soviet Bloc. With strategic warning of 14 hours or more, 2244 bombers and missiles, carrying 3267 weapons yielding more than 7800 megatons, would attack a total of 1060 DGZs, including those in more than 150 urban areas. Eight hundred of the DGZs were defined as "'military targets.'" [56]

On the eve of the crisis, with 70 additional SAC bombers (mostly B-52s and additional ICBM and SLBMs) the number of fully generated weapons in SIOP-63 was probably over 3,500 weapons.

The U.S. stockpile at the time was growing rapidly. In October 1962 there were 26,400 warheads in the stockpile with some 200 warheads being added each month. The combined yield was 12,825 megatons down from the 1960 peak of over 20,000 megatons.

iii. U.S. Bombers

On October 22, U.S. military forces worldwide went on DEFCON 3 at 7:00 pm (1900 hours EDT/1600 hours PDT/2300Z) the precise time that President Kennedy went on television and delivered a 17-minute speech announcing "unmistakable evidence" of the presence of missiles and bombers in Cuba and that a "strict quarantine on all offensive military equipment" is being put into effect.

CINCSAC General Thomas Power ordered his forces to DEFCON 2 at 10:00 am Washington time on 24 October 1962 as the Naval quarantine was coming into effect. An hour later General Power used the Primary Alerting System to address his forces on the seriousness of the situation. On his own initiative the message was sent in the clear. He felt it was important for the Soviets to know of SAC's readiness and they surely heard the message.

Airborne alert[57]

In the late 1950s Strategic Air Command implemented airborne alert missions with the codename, Chrome Dome. B-52s, loaded with nuclear weapons, were in the air 24 hours a day, 365 days a year.[58] Normal Chrome Dome airborne alert missions numbered 12 B52 launches per day, four on the southern route, six on the northern route and two to monitor the Thule BMEWS. The Thule Ballistic Missile Early Warning System, located in Greenland, began operations in 1960 to warn of Soviet missile launches. Because the radar was vulnerable to sabotage or conventional attack SAC had one of its B-52s on airborne alert over Greenland to monitor the BMEWS. If the Thule radar went dead the B-52 could communicate with SAC that the BMEWS had been struck and a Soviet attack had begun.[59]

On October 22 at 1700 EDT (two hours prior to President Kennedy's address to the nation) SAC went to a one-eighth airborne alert force. The airborne alert operation increased to sixty-six daily launches (28 southern, 36 northern and 2 Thule monitor) and by November 5th, with more B-52Hs available, to seventy-five.[60]

According to the SAC history of the Cuban crisis, "Depending upon aircraft configuration and unit equipage, internal weapons for airborne alert bombers generally consisted of four Mk B-28s or two Mk B-15/B-39s."[61] The B28 came in many variations depending upon fuzing and whether it had a parachute. In the SAC history "Yield 1" is specified which was either 1.1 Mt or 1.45 Mt. The B15/39 had a yield of 3.4 Mt to 3.8 Mt. Thus each airborne alert bomber carried bombs with a combined yield of between 4.4 Megatons and 7.6 Megatons.

At the direction of the JCS General Power terminated the 1/8 airborne alert posture effective 0600Z November 21 and returned to its normal level. During the one-month operation 2,088 B-52 aircraft were launched; airborne alert flying hours totaled 47,168.[62]

Bomber dispersal

Simultaneously with the increase in airborne alert the JCS directed SAC to implement dispersal plans for its B-47 force. This consisted of 183 aircraft at 15 bases. Within two hours of the order the first B-47 left its home base and within 24 hours all 183 bombers had dispersed to 32 locations, either military installations or civilian airfields. The dispersal terminated on November 24.[63]

Force generation

With DEFCON 2 the rest of the force was placed in a maximum state of readiness. SAC attained its greatest striking power on November 4th. Ready on that day for employment in retaliatory attacks were 1,479 bombers, 182 ballistic missiles[64] 2952 total weapons and 1,003 tankers. In contrast the numbers available on 19 October had been 653 bombers, 112 ballistic missiles, 1422 total weapons and 358 tankers. While SAC was at DEFCON 2, 92.5 percent of its weapon systems were ready to launch within one hour.[65] Between 23 October and 26 November, SAC bombers made 2,511 flights (with a total of 8,101 weapons aboard without an accident.[66]

"A total of 220 'high priority Task 1 targets' in the Soviet Union had been selected for immediate destruction. The targets ranged from missile complexes

and military bases to 'command and control centers' like the Kremlin, in the heart of Moscow, and 'urban industrial targets,' such as steel mills, electrical grids, and petroleum facilities. Many targets were scheduled for attack several times over, by plane and missile, just in case the first bombs failed to get through."[67]

Early SIOPs included aircraft weapons, cruise missiles and ballistic missiles from Pacific Command, Atlantic Command and European Command. For SIOP-62 (July 15, 1961) these totaled 1087 of the 3267 weapons (with the balance of 2180 weapons allocated to SAC).[68]

Pacific Command[69] (c. 220 nuclear weapons)

On October 25
11 B-57 Canberra (1 nuclear bomb)
50 F-100 Super Sabre (1 B7, B28, B43)
5 A3J Vigilante (after 1962 A-5) (1 B27, B28, B57 or 2 B43)
16 A-4D/F Skyhawk (1 nuclear bomb)
16 Mace in Okinawa
4 Regulus missiles

Three aircraft carriers in the Western Pacific
Oriskany (CVA 34), Depart 07 June 1962, return 17 December 1962
Air Wing CVG-16 (40 bombs)
Bon Homme Richard (CV 31), Depart 12 July 1962, Return 11 February 1963
Air Wing CVG-19 (40 bombs)
Kitty Hawk (CVA 63), Depart 13 September 1962, Return 02 April 1963
Air Wing CVG-11 (40 bombs)

European Command (c. 250 nuclear weapons)
Aircraft and missile forces on alert included:[70]
27 F-100 Super Sabre (1 B7, B28, B43)
9 F-101 Voodoo (1 B7, B28, B43)
15 F-105 Thunderchief (1 B28 or B43 internal or 2 B28 or B43 external)
2 A3J Vigilante (after 1962 A-5) (1 B27, B28, B43, B57 or 2 B43)
4 A4D/FJ4 Skyhawk/Fury (1 nuclear bomb)

4 AD Skyraider (1 nuclear bomb)
3 Valiant (2 B28)
10 F-84 F Thunderstreak (1 nuclear bomb)
4 B-57 Canberra (1 nuclear bomb)
37 Jupiter
Two aircraft carriers in the Med
Franklin D. Roosevelt (CVA 42) – depart 14 September 1962 – Return 22 April 1963 Air Wing CVG-1 (40 bombs)
Enterprise (CVAN-65) – depart 3 August 1962 – Return 11 Oct 1962
CVG-6 Air Wing (40 bombs)

48 Mace – USAF deployed the Mace (TM-76A) in Europe in 1959, and it served alongside the Matador before the latter was phased out in 1962. Mace cruise missiles had a range of between 540 miles (low altitude) and 1288 miles (high altitude). It carried a W28 warhead (Yields 70 kt, 350 kt or 1.1 Mt). They were deployed to Germany with the 1st Pilotless Bomber Squadron at the end of 1955 and were withdrawn in June 1969.

Appendix B

Soviet Strategic Forces[71]

Over the course of the crisis there were various estimates by U.S. intelligence about the number and types of Soviet forces in Cuba, facing Europe and in the Soviet Union. One of the more authoritative estimates of what U.S. intelligence thought at the time about Soviet forces is contained in a memorandum prepared by Raymond Garthoff, for the Ex-Comm, dated 27 October 1962, "The Military Significance of the Soviet Missile Bases in Cuba."[72] In later comments about the memo Garthoff included the estimate comparing the forces at the time.

	U.S.	U.S.S.R
ICBM launchers	229	44 (+6)
SLBM launchers	144	97
MR/IRBM launchers	105	(20-40 in Cuba)
Strategic bombers	1,300	155+

"Estimates at the time gave the Soviet Union around one hundred fifty long-range bombers and between fifty and one hundred intercontinental ballistic missiles that could reach the United States in about half an hour. Later information put the number of Soviet ICBMs at only twenty."[73]

i. Soviet ICBMs[74]

The most authoritative figures on ICBM availability come from Strategic Rocket Forces historian Lt. Col. Sergei Karlov. He concluded that there were 42 ICBMs deployed during the crisis.[75] These included six SS-6s (R-7) and 36 SS-7 (R-16). Four of the SS-6s were on open launch pads at Plesetsk and two were reserve missiles at Baikonur that were not on permanent duty as they were intended for space exploration. During the crisis the two Baikonur SS-6s were made ready by being fueled and attaching a warhead.[76]

A topic for further research is to understand the alert procedures of the Strategic Rocket Forces in particular the Soviet military in general. Were there Soviet counterparts to the U.S. Defense Readiness Conditions (DefCon) and were they activated during the crisis? Were the ICBMs "combat ready," able to be fired with assigned targets?[77]

The SS-6 was the first Soviet ICBM.[78] It was a one and one-half stage cryogenic, liquid-propellant missile capable of delivering a 10,000 lb reentry vehicle, (with a 2.8 megaton warhead) to a range of 9000 kilometers and had a CEP of five kilometers. They were too large to fit in silos and were fired from reinforced concrete launch pads. It took twenty hours to prepare for launch and could not be kept on alert for more than a day.[79] The liquid fuel for the missiles was corrosive and toxic, could leak, and was potentially dangerous.

The majority of the Soviet ICBM force during the crisis was the 36 SS-7s (R-16), 26 in silos and 10 on open launch pads. The SS-7 Saddler was a two-stage storable, liquid-propellant ICBM capable of delivering 3500 lb reentry vehicle to a range of 12,000 kilometers with a CEP of 1.0-1.25 nm. It was deployed in soft and

hard sites. Reaction time under normal conditions was three hours for soft sites and five to fifteen minutes for hard sites.[80]

American estimates at the time were slightly higher. As of 30 June 1962 the U.S. estimate was 32 at soft sites. The CIA estimated that the Soviets had 60-65 ICBMs operational. Later assessments reduced the number to 44 operational with six training launchers with some operational capability, close to Karlov's figure.

ii. Soviet Ballistic Missile Submarines

The original Soviet plan was to deploy seven Golf I (Project 629) diesel submarines to Cuba, each carrying three SS-N-4 Sark (R-13) ballistic missiles with a single 1.45 Mt warhead and nuclear torpedoes.[81] The missile had a range of 640 km (400 miles). The plan was dropped for several reasons. There were no missile facilities in Cuba able to service the liquid fueled missiles. The fuel could only be left in the missiles for thirty days after which it became a safety concern. A diesel submarine on patrol had to change its batteries every one or two days and had to surface making it vulnerable to anti-submarine warfare systems. Furthermore the submarine had to surface for 15-20 minutes to launch all of its missiles. Finally the range and accuracy of the SLBMs was limited.

In mid-1962 according to NIE 11-8-62 (July 6, 1962) there were 161 nuclear missiles on 52 submarines. These included ten Hotel (three ballistic missiles each), four Echo (six cruise missiles each), seven Zulu (two ballistic missiles each), 25 Golf (three ballistic missiles each) and six converted Whiskey (three cruise missiles each). With SS-N-3 cruise missiles and SS-N-4 ballistic missiles the Soviet diesel and nuclear submarines would have to within 150-350 nautical miles to reach their targets and avoid U.S. Navy ASW forces.[82] The cruise missile submarines probably had an anti-carrier mission rather than a land-attack mission and after 1962 were dropped from U.S. intelligence estimates.

Although the Soviets had many ballistic missile (and cruise missile) submarines none played a role in the Cuban crisis.

iii. Soviet Bombers

Secretary of Defense McNamara testified before the Senate Foreign Relations Committees on September 5, 1962 that the Soviets had about 165 long-range bombers and tankers and about 950 medium-range bombers and tankers. “[T]hey could put about 200 bombers, we believe, over North America today.”[83] This is close to a later estimate: "By the end of 1962 Long Range Aviation had about 100 Tu-95 [Bear] and 60 3M [Bison B] bombers, which could deliver about 270 nuclear weapons to U.S. territory."[84]

It is unclear how many of these bombers were on some stage of alert, whether they were on the tarmac, with weapons loaded and crews aboard and target folders at hand. More is needed to be known about the status of these aircraft.

In conclusion, Soviet strategic forces totaled some 300-320 weapons (all but about 40 of them bomber weapons), with the potential of hitting the United States. If war had broken out and Soviet Bear and Bison bombers attempted to fly over the North Pole to attack North American targets they would have been met by formidable U.S. and Canadian air defenses. Air defense interceptor aircraft, many (or perhaps all) armed with nuclear Genie or Falcon air-to-air missiles would likely have prevented any Soviet bomber from reaching its target. (The same situation would have been the case for the any of the Beagles flying from Cuba.)

As noted above the U.S. had over 3,500 fully generated weapons at the ready to use against the Soviet Union. The Soviet Union may have had around 300 weapons ready to use against the United States. While that is a ratio of about dozen-to-one, given the difficulty of Soviet bombers to carry out their missions, the actual ratio is probably higher.

The question of whether nuclear superiority played a role in resolving the crisis has been studied at length and is not part of the purpose of this paper but it is worth reviewing the issues. One scholar summarizes: “[W]ith regard to the

political process, however, the more important question is whether it was nuclear superiority or nuclear danger that was more important for the settlement. How did U.S. nuclear superiority and Soviet nuclear inferiority affect the decision making of the two governments? Were members of the Kennedy administration prepared to take greater risks because they were more willing to face a nuclear conflict than were leaders of the Soviet Union? Did the Soviet leaders, on the other hand, feel so inhibited by their nuclear 'inferiority' as to be limited in their freedom of maneuver? Did they feel compelled to bring about a quick settlement of the crisis? Or were both sides motivated by fear of escalation?"[85]

Appendix C.
Regional Nuclear War - European Theater

A. U.S./NATO Forces

One factor in Khrushchev's decision to base missiles in Cuba was to respond to U.S. intermediate-range missiles in Italy, the United Kingdom and Turkey.[86] During the crisis 105 missiles carrying 105 nuclear warheads were operational in the United Kingdom (60 Thor IRBMs), Italy (30 Jupiter IRBMs) and Turkey (15 Jupiter IRBMs).[87] The missiles in Italy and the United Kingdom played no diplomatic role in the crisis though they posed a nearly similar threat as the missiles in Turkey.

i. Thors in the United Kingdom

The formal agreement to deploy Thors in Great Britain was signed on February 22, 1958**.** The Thor had a range of 1,740 miles and carried one W49Y2 warhead with a yield of 1.4 Megatons.

On June 22, 1959 SAC transferred the first Thor squadron to the 77th RAF Strategic Missile Squadron. In addition SAC assigned a detachment to each Thor squadron to:

(1) retain custody and control and provide maintenance for re-entry vehicles and warheads

(2) receive and initiate U.S. warhead release order

(3) operate USAF communication facilities, and

(4) provide training to the RAF.

Four squadrons became operational between June 1959 and April 22, 1960 when the final Thor squadron was transferred to the RAF.[88] On June 3, 1960 the first Thor missile was mated to its warhead. From June 1960 until late November 1962 there were 60 Thors deployed in Great Britain.

> "As the Cuban Missile Crisis reached its climax, 59 British IRBMs, each capable of unleashing a destructive power one hundred times greater than that used over Hiroshima, were at 15 minutes readiness (or less). The USSR possessed less than half that number of ICBMs capable of targeting the USA. The United States, in contrast, had an estimated 5000 nuclear warheads able to strike at the Soviet Union."[89]

On August 1, 1962 the British Defense Minister informed Parliament of the planned phase out of Thor missiles in the U.K. to be completed by December 31, 1963. On November 29, 1962 the first Thor IRBM was removed from alert under the phase out program and on August 15, 1963 the last missile came off alert.

ii. Jupiters in Italy and Turkey

While President Kennedy inherited the Jupiter agreements from the previous administration, he, and not Eisenhower, would deploy the missiles to Turkey and later secretly agree to remove them as part of the settlement of the crisis.[90]

The first Jupiter agreement was signed between the U.S. and Italy on March 26, 1959 to deploy two squadrons (30 missiles) of Jupiter IRBMs on Italian soil.[91] The Jupiter was a single-stage, liquid fueled rocket with all inertial guidance. It had a range of 1,750 miles and carried a W49Y2 warhead with a yield of 1.4 MT. The Italian base was located at Gioia del Colle in the Puglia (the heal of Italy), where each squadron was organized into five flights of three missiles each. The ten launch-positions were dispersed widely over an area of roughly 800 square miles. The missiles were highly vulnerable, standing vertically in the open

countryside on launch pads; a sniper's bullet could piece their thin skin of the missile rendering them inoperable.

The two squadrons of Jupiter missiles in Italy became operational between February and July 1961.[92] They were not there very long. "In February 1963, the JCS designated the Air Force as executive agent for withdrawing Jupiter missiles from Europe. Nicknamed Pot Pie I and II, the withdrawals began April 1, 1963. By April 23, all of the missiles and equipment from Italy were disassembled. The Jupiters departed from Turkey on July 26 [1963]."[93]

The agreement between the United States and Turkey was completed in October 1959 to deploy one squadron of 15 missiles (NATO II). The Turkish base was at Cigli Air Base near Izmir in western Turkey. By the time Kennedy became president, and for six months afterwards, the missiles had not yet been delivered.[94]

When did the Jupiters in Turkey become operational? An Air Force historian says, "The first launch positions became operational as scheduled on November 6, 1961. A second position came on alert the following month, and the fifth and final position became operational on March 5, 1962."[95] Finally, on October 22, 1962 SAC turned over the single Jupiter IRBM squadron in Turkey to Turkish Air Force personnel, in the middle of the Cuban missile crisis.[96] The squadron's warheads, however, remained in SAC's custody and possession until such time they might be released for launch by an American warhead release order.[97]

According to historian Barton Bernstein the 45 Jupiters were targeted against 45 of the 129 Soviet MRBM-IRBM sites.[98] Zaloga adds that, the Soviet Army had responded to the American deployments in Turkey by deploying their own MRBM sites at Krasnovodsk and Kirovabad.[99]

President Kennedy had asked the Pentagon to look into having the obsolete missiles removed, most recently in August, only to have the bureaucracy fail to implement his decision.[100] One scholar concludes, "He certainly would have liked to remove them, for he believed that keeping them deployed entailed serious risks – but risks less serious than those he associated with removal. He thus issued

no order, and made no decision, to remove the Jupiters before October 1962, despite the many works that have continued to make this claim."[101]

The Cuban missile crisis was resolved in part on October 28, 1962 with Khrushchev's agreement to remove the ballistic missiles from Cuba and President Kennedy's non-public promise to remove the Jupiters in Turkey. On 17 January 1963, the U.S. announced the phase out of the one Jupiter squadron in Turkey and six days later, on 23 January, the Turkish government announced the phase out as well. The missiles were removed from alert in April 1963 and the last IRBM was shipped in July. "On April 25, 1963, six months after the Cuban missile crisis, McNamara informed President Kennedy, 'the last Jupiter came down [in Turkey] yesterday,' and it would be flown out at the end of the week."[102]

To compensate and to send a message to the USSR (and to Turkey) the USS *Sam Houston*, a SSBN carrying 16 Polaris A-2 SLBMs visited Izmir Turkey on April 14, 1963.

iii. U.S./NATO aircraft on QRA

Thirty-seven U.S. aircraft on Quick Reaction Alert (QRA) in Europe and Turkey were loaded with nuclear weapons on October 25, the second day of the quarantine.[103] Quick Reaction Alert was a higher state of readiness whereby planes were on the runway, fueled and armed with weapons, with their pilot or pilots nearby able to be airborne in 15 minutes or less.

The planes were likely F-100s and F-84Fs based in Germany (at 2 or 3 bases), Italy (Aviano), Netherlands (Camp New Amsterdam), Turkey (Incirlik) or the United Kingdom (at 2 or 3 bases). They were responsible for attacking thirty-seven "high priority" targets, mainly airfields in East Germany.[104] Earlier that year, in April, President Kennedy had ordered that loading bombs onto the F-100s be prohibited because the weapons did not have electronic locking systems. On October 27 the Generals were successful getting Kennedy to reverse his decision.

The issue of custody and control had been raised during a December 1960 visit to NATO bases by members of the Joint Committee on Atomic Energy accompanied by Harold Agnew, Director of Los Alamos Scientific Laboratory.[105] They witnessed on their visits to several NATO air bases four QRA aircraft which sat at the end of the runway, loaded with a nuclear bomb. The pilots were nearby

ready to take off, day or night, in fifteen minutes. At a base in Germany the delegation noticed the plane was lightly guarded and there was little to stop a pilot from taking off on a bombing mission of his own. In addition safety concerns were raised about certain bombs, specifically the Mk 7 and Mk 12. This led to recommendations to use coded arming control devices that could be incorporated as part of the weapon. Upon proper authorization from the President the U.S. custodian would enter a code to arm the weapon. "Prior to this operation the device prevents receipt by the warhead of arming signals, thus preventing detonation."[106]

In addition to the planes on QRA there were other U.S./NATO aircraft placed on alert, loaded with nuclear weapons.[107] These included F-84, F-100 F-101, F-105 and B-57 aircraft.[108]

Mace cruise missiles

Mace missiles served alongside the Matador (TM-61) before the latter was phased out in 1962. Mace cruise missiles had a range of between 540 miles (low altitude) and 1288 miles (high altitude). The missile carried a W28 warhead (Yields 70 kt, 350 kt or 1.1 Mt). They were first deployed to Hahn AB, Germany with the 1st Pilotless Bomber Squadron in 1954; in 1956 the newly activated 701st Tactical Missile Wing. 71st Tactical Missile Squadron. Ninety Mace missiles were assigned in 1962. The MGM-13A variant used a mobile launcher and was phased out of USAFE by 1 September 1966. One squadron of the CGM-13B variant used a zero-length launcher at a hardened site until it was inactivated in April 1969.

B. Soviet Forces facing Europe (c. 500 nuclear weapons)

In 1962 the Soviet Union had over 550 medium-range and intermediate-range ballistic missiles: 528 SS-4s, 492 at soft launch sites and 36 at hard launch sites.[109] The SS-4 constituted the bulk of the Soviet offensive missile threat to Europe. Initial operational capability of the SS-5 at soft sites occurred in late 1961. As of June 30, 1962 there were 28 deployed.[110]

There is no public information about whether the Soviets may have had Tu-16 Badger or Tu-22 Blinder bombers, or strike fighters such as the MiG-21 Fishbed, on alert, at bases in the western USSR ready to attack European targets.

Appendix D
Local Nuclear Forces in and around Cuba[111]

The question of whether General Issa A. Pliyev ever had the authority to order the use of Luna (FROG) and/or FKR-1 missiles is contentious.[112] One scholar concludes:

"Although there has been some debate over whether the local commanders were given launch authority in advance by the Soviet government, recent documents released in Russia make it clear that Moscow informed the commander of the Group of Forces in Cuba that the nuclear warheads on the FKR, Luna tactical rockets, and IL-28 jet bombers were not to be employed without specific authorization from the Kremlin. However, the evidence would suggest that Moscow did not have any actual negative technical control over the weapons, and that the local commanders could have used them without permission had war broken out, assuming the assent of the custody units."[113]

A. Soviet Forces

The original Soviet plan called for deploying 80 ballistic missiles (with 40 launchers) in Cuba: 48 SS-4 MRBMs (24 launchers) and 32 SS-5 IRBMs (16 launchers). By mid-October only 42 SS-4s (and 24 launchers) had arrived. These would be at the center of the crisis as the rest of the missiles, six (6 SS-4s and 32 SS-5s) and launchers (16 for SS-5 missiles) never arrived. There is a question as to why there are differences between the original Anadyr Table of Organization and what arrived in Cuba (including that which was halted at sea by the quarantine).

First warhead shipment: By the time of the quarantine on October 24, 158 warheads, of five types, had arrived in Cuba. Ninety warheads arrived at Mariel on October 4th aboard the *Indigirka*. These included 36 SS-4 warheads, 36 FKR-1 warheads, 12 FROG warheads, and 6 bombs for the Il-28 bombers. The SS-4 warheads were stored at Bejucal and the FROG warheads went to Managua. The six bombs for the Il-28s were stored in a mountain tunnel protected by some barbed wire and a fence.[114]

Second warhead shipment: On October 23 sixty-eight warheads arrived at La Isabela aboard the *Alexandrovsk.* These included 24 SS-5 warheads and 44 FKR-1

warheads. As there were no SS-5 missiles in Cuba the SS-5 warheads were never unloaded.

The original plan called for four nuclear naval mines to arrive with Soviet naval forces in October (bringing the total number of nuclear warheads to 162), but these never arrived.

Soviet troop strength on Cuba on October 24 was 41,902 (of a planned 45,000), four times what the U.S. intelligence had estimated. These included the 51st Missile Division (7,956 missile troops) led by Gen. Maj. Igor D. Statsenko).

Soviet Nuclear Weapons in Cuba

i. SS-4 Sandal (R-12)

Thirty-six SS-4 Sandal (R-12) MRBMs plus six training missies (a total of 42 missiles), with 24 launchers and supporting equipment arrived in Cuba aboard the *Omsk* on September 7th or 8th and aboard the *Poltava* on September 15th. The original table of organization/order of battle called for 48 MRBMs, two missiles for each launcher. There is some uncertainty about whether the original number was reduced or whether six additional SS-4 missiles and twelve additional SS-4 warheads (plus eight more warheads for the SS-5s) were ever shipped but never arrived due to the quarantine which began on Wednesday, October 24.[115] There is no record of a third ship carrying nuclear warheads to Cuba besides the *Indigirka* and the *Alexandrovsk*.

We now know that Dean Rusk's often quoted remark that, "We're eyeball to eyeball, and the other fellow just blinked", that supposedly occurred on October 24, is a myth. This dramatic moment has been included in many books about the missile crisis but careful research by Michael Dobbs proves that this showdown never happened. Soon after President Kennedy's speech on the 22nd Khrushchev ordered that certain ships turn back on the 23rd and the *Kimovsk* and the *Yuri Gargarin* were more than 500 nautical miles eastward, when Rusk's near confrontation allegedly took place. The imagery "served the political interests of the Kennedy brothers, emphasizing their courage and coolness at a decisive moment in history."[116]

The SS-4 was deployed with the 514th, 539th and 546th regiments.[117]
Thirty-six one-megaton warheads arrived at the port of Mariel on October 4 aboard the cargo ship *Indigirka*.[118]
Max range: 1300 statute miles (2080 km)[119]
The MRBMs could reach 38 per cent of B-52 bases and eight per cent of Atlas ICBM bases.[120] It would take approximately 13 minutes to travel from Cuba to Washington, DC.

On October 22, the date of President Kennedy's speech to the nation, no missile had yet been fueled, targeted or mated with a warhead. According to General Major Igor D. Statsenko only six to eight R-12 launchers reached operational status before the dismantling order arrived at 1300-1500 hours on Sunday October 28.[121]

ii. SS-5 Skean (R-14)

The original plan was to deploy two regiments (the 564th and 657th) with 32 R-14 IRBM (SS-5 Skean) missiles with 16 launchers. Neither the SS-5 launchers nor the SS-5 IRBMs arrived. The two missile regiments on two ships with 16 SS-5 launchers and 32 SS-5 missiles were ordered to turn back. But 24 warheads for the SS-5s did arrive. The *Alexandrovsk* carried 24 SS-5 one-megaton warheads (and 44 warheads for the FKR) and dropped anchor at La Isabela on October 23 hours before the quarantine went into effect in the early hours of the 24th.

There is some uncertainty about whether the original number was reduced or whether eight addition warheads for the SS-5s were ever shipped and never arrived due to the quarantine which began on Wednesday, October 24. There is no record of a third ship carrying nuclear warheads to Cuba besides the *Indigirka* and the *Alexandrovsk*. With no missiles to mate with the SS-5 warheads were never unloaded (though the cruise missile warheads were).
Max range: 2800 statute miles (4500 km)[122]
The IRBM could reach all B-52 bases and all Atlas squadrons in the U.S.[123] Some 92 million Americans lived within range of the missiles.[124]
Accuracy: 2.4 km CEP.

iii. 80 FKR-1 (Meteor) (F*rontoviye Kriatiye Raketi*) land-attack cruise missile
Range; approx 50-60 miles
Deployed in Cuba with the 561st and 584th regiments. Each regiment had eight launchers and five rockets per launcher for a total of 80 missiles equipped with 80 fourteen-kiloton warheads. Thirty-six warheads arrived in Cuba on October 4th and forty-four on October 23.

iv. **12 Luna (FROG-3/5) missiles** with six launchers and twelve two-kiloton nuclear warheads (four warheads per battery). FROG (for Free Rocket Over Ground) had a range of approximately 20-25 miles. The Luna battalion had three batteries attached to three regiments (the 74th, 134th and 146th) deployed near Artemisa, Havana and Santa Clara. Overall there were 36 FROG missiles in Cuba, 12 nuclear and 24 conventional. They were first discovered by the U.S. on October 25.

v. **Six (12-kiloton) bombs for six Ilyushin Il-28 bombers.** The Beagle's combat radius was 700 miles enough to reach southern Florida. The Il-28s became an issue and their removal was essential to a final resolution of the crisis. Forty two Il-28s were delivered to Cuba. Most had not been assembled or taken out of their crates. Some were stationed at San Julian under control of the Soviet Navy and equipped with torpedoes and mines and were intended for attacks on U.S. naval invasion forces.

The nuclear capable Il-28s were at an airfield outside the city of Holguin but remained in their crates. "The Holguin squadron consisted of nine bombers under the control of the Soviet air force. Six of them were designed to carry the Tatyana [Fat Man type] bombs; the remaining three planes would fly in front of the squadron, serving as a decoy to enemy radar systems."[125]

Why were the tactical nuclear weapons shipped to Cuba if not to defend Soviet and Cuban forces?

"There is no evidence that Khrushchev deployed the tactical nuclear forces for their deterrent value. There were no known plans to disclose the presence of

these units, and their existence was not revealed until the early 1990s, after the collapse of the Soviet Union. They were deployed to fight had the United States invaded Cuba, and U.S. intelligence at the time was not aware of them."[126]

"Would a desperate group of Soviet defenders, with or without an order from above, have been able to arm and fire even one Luna warhead . . . or one of the more powerful [cruise missile] charges? If such a rocket had hit U.S. troops or ships, if thousands of Americans had died in the atomic blast, would that have been the last shot of the Cuban crisis or the first of a global nuclear war?"[127]

An enormous number of men and huge amounts of materiel had to be transported to Cuba. Shipping by air was ruled out and an armada of naval vessels would have drawn too much attention; thus merchant ships were chosen. The first ship to arrive in Cuba, the *Maria Ulyanova*, was on July 26, 1962. In all some 85 marine passenger and freight ships made 150 round trips between the Soviet Union and Cuba originating from three ports in the Baltic area, two ports in the Arctic area and four ports on the Black Sea,[128] delivering men and materiel to 11 Cuban ports selected to receive Soviet ships. The last ship to remove the strategic missile warheads left on November 7. The last tactical nuclear weapons were not shipped from Cuba until December 1st.

B. U.S. Nuclear Forces facing Cuba

i. Guantanamo

Little is known about the U.S. nuclear weapons deployed on Cuba during the missile crisis. From December 1961 until July-September 1963 there were a number of "non-nuclear depth bombs" deployed at Guantanamo Naval Base in Cuba. "Non-nuclear" meant that all but the fission cores were deployed. The fission cores for the Guantanamo weapons were stored elsewhere, either aboard ships or at naval bases, most likely in Florida. In either event the cores could have been rushed to Cuba, inserted into the bomb casings and put aboard anti-submarine aircraft. The weapon type was probably the Betty nuclear depth bomb using a B7/Mk7 warhead, deployed from 1955-1963, later replaced by the B57 depth bomb. Another possibility is the Mk 101 Lulu depth bomb using a W34

warhead that entered the inventory in 1958. Both depth bombs could be carried by all contemporary Navy ASW aircraft. These included the P2V-3C Neptune (land-based), the S2F/S-2 Tracker (carrier-based) aircraft, and the SH-34G/J Seabat carrier-based helicopter. None of the accounts of the crisis have mentioned these weapons and whether there were any contingency plans to use them.

Over 2800 dependents of Navy and Marine Corps families were evacuated from Guantanamo on October 22d. It is unclear how many Navy and Marine Corps personnel may have remained and what their role was in the crisis. While dependents were leaving the garrison was reinforced with three Marine Battalion Landing teams numbering 5000 Marines and two naval construction battalions.

We now know that the FKR cruise missiles were targeted at the U.S. base at Guantanamo Bay. One regiment, near Mariel was intended to defeat an amphibious landing. A second regiment, located in the Sierra de Micaro hills, overlooked Guantanamo Bay. Its purpose was to defeat any amphibious landing and destroy any U.S. forces operating from Guantanamo Bay. According to Michael Dobbs, around October 24 the Russians moved a convoy of FKR cruise missiles to a pre-launch position at the village of Vilorio and two days later moved to the village of Filipinas, 15 miles from Guantanamo. They remained there until November 12. Navy intelligence misidentified them as "unidentified artillery equipment."[129]

ii. Air Defense

Soon after the Soviet missile sites were discovered U.S. air defense forces were mobilized.[130] On October 22 Air Defense Command dispersed 161 aircraft to 16 bases in nine hours, eventually 173 at 17 bases. All dispersed ADC aircraft were armed with nuclear weapons for the first time.

Six early warning RC-121s were based at McCoy AFB, FL. Four USAF interceptors operated from Homestead AFB, FL, two from Tyndall AFB, FL and eight Navy planes from Key West Naval Air Station. On October 19 Air Defense

Command increased the number of interceptors standing alert and by October 22 the Air Force had 12 RC-121s and some 82 interceptors, for which nuclear weapons were available, on guard in Florida. That evening when President Kennedy informed the nation and the world about the missiles in Cuba "22 interceptors were aloft over Florida as a precautionary measure in the event Premier Castro attempted to launch a surprise attack."[131]

By October 25 there were over 1000 air defense aircraft on alert; 598 on five to fifteen minute ground alert, and 446 on one to three -hour alert.[132] Florida CONAD forces of 154 aircraft were broken down as follows:

26 on 5 minute alert
35 on 15 minute alert
55 on 1-3 hour alert
4 to 11 aircraft were continuously airborne around the Florida Peninsula.

On October 31 the JCS approved a reduction of CONAD's dispersed air defence force from 173 to 143. On November 18 CONAD returned its dispersed aircraft to their home bases and re-established the normal one-third alert.

During the period October 22 to November 26, ADC flew a total of 13,047 sorties, 2,800 of them from Florida bases.[133] The planes were F-102A Delta Daggers armed with the nuclear AIM-26A Falcon air-to-air missile and F-106A/B Delta Darts armed with one nuclear AIR-2A Genie air-to-air missile. In 1962 there were 42 U.S. Interceptor squadrons. In terms of number of planes the Air Force accepted 889 F-102As and some 340 F-106s (275 F-106 As and 63 F-106Bs).

If war had broken out and Soviet Beagle bombers had attempted to fly to attack the United States they would have been met by formidable U.S. air defenses. Many (perhaps all) air defense interceptor aircraft were probably armed with nuclear Genie or Falcon air-to-air missiles and would have likely prevented any Beagle bombers from reaching their targets in the U.S.

Other components of U.S. air defense at the time included:
* 68 Distant Early Warning (DEW) line radars stretching from Alaska to Greenland;
* two squadrons of Radar Picket Ships (eight ships on the East coast and eight ships on the West coast):
* two Texas Towers in the Atlantic off the coast of Cape Cod;
* 132 Nike Hercules batteries, and:
* eight BOMARC surface-to-air missile squadrons in the U.S.

iii. Tactical Air Forces

On October 19 Tactical Air Command (TAC) began a major deployment into the Florida area. Some 623 aircraft – 511 fighter-bombers (F-100's and F-105's), 72 reconnaissance aircraft (RF-101's and RB-66's) and 40 tankers (KB-50's) converged on the southeastern corner of the country, with 460 in Florida two days later.[134] Many of these planes were equipped with nuclear bombs and they were in invasion plans until the JCS rescinded the decision to use tactical nuclear weapons on October 31.

iv. U.S. Naval Forces

One hundred and eighty-three ships took an active part in Cuban operations during the quarantine. Plans for invading Cuba were prepared and briefed to the President. Two aircraft carriers, the *Independence* and *Enterprise*, were within 150 miles of Cuba. Each carrier had some forty nuclear bombs available for its aircraft.[135]

v. Invasion plans

By the morning of 23 October, the Oplan 312 tactical strike force was on one-hour alert and capable of going immediately to a higher stage of readiness. On the 26th TAC began low-level reconnaissance over Cuba which disclosed additional targets and resulted in air offensive planning for three massive airstrikes a day until Cuban air capability was destroyed. The first of these strikes, including Naval forces, was to involve 576 sorties; the second and third strikes scheduled for the first day of operations would bring the total sorties to 1,190.

As of October 26 CINCAFLANT had 579 aircraft in his attack force. On October 28 all alert crews were on standby status in the operations ready rooms, and external power plants were connected to the aircraft.

From October 29 through the end of November, Air Force contingency actions were devoted primarily to maintaining the alert force, and preserving simultaneously the overall capability of USAF's combat commands. Continual re-evaluation of the Oplans, in anticipation of a possible invasion of Cuba, led to a JCS decision on October 31 against the earlier planned use of tactical nuclear weapons in invasion operations.[136]

After the discovery of Ilyushin bombers and FROG missiles (on October 25) U.S. invasion plans were revised to include use of tactical nuclear weapons such as Honest John missiles.

III. Wild Cards and Business as Usual

A. Atmospheric Testing

While the crisis unfolded according to its own timetable the U.S. atmospheric test program continued unabated, with business as usual. Three tests were conducted near Johnston Island in the Pacific during the days of the crisis.

* Shot *Checkmate* (10-20-62) was a high-altitude (91.5 miles) effects test using XW-50X1 warhead atop a STRYPI Rocket (XM-33).
* Shot *Bluegill Triple Prime* (10-26-62) used a W50 sub-megaton warhead atop a Thor Rocket detonating at 30 miles altitude.
* Shot *Calamity* (10-27-62) involved a B-52 airdrop of a 800 KT bomb, detonating at 11,780 feet.[137]

For its own part the Soviet Union reciprocated and carried out seven tests between October 20 and 28, 1962. The one on October 22 was a 8.2 megaton detonation at Novaya Zemyla.

Just prior to the crisis, "As training for the Cuban deployment RVSN troops conducted an exercise code-named Tyulpan on 1-8 September 1962 firing two R-14 missiles from the Aginsky proving ground toward nuclear impact sites on Novaya Zemlya, one armed with a normal nuclear warhead, and the other with a new experimental warhead."[138] According to the official Soviet list there were tests on September 2, 1962 at Novaya Zemlya (80 kt) and on September 8, (1.9 Mt).

B. The Vandenberg Missile Launch

"When DEFCON 3 was declared at the beginning of the crisis, one Atlas ICBM was ready for a test launch that had been previously scheduled for later that week. Although nuclear warheads were being placed on the ICBMs in surrounding launch facilities, the test reentry vehicle was maintained on this single missile. Despite the severity of the crisis and the emergency alert operations taking place, *this Atlas ICBM was actually launched, without further orders from Washington political authorities, at 4:00 A.M. on October 26th.* Ironically, while senior leaders in Washington were carefully monitoring the operational alert status of the Soviet missiles in Cuba, a U.S. missile was actually being launched, without their knowledge, in California."[139]

C. **Foxtrot submarines**[140]

While the Soviet surface vessels carrying additional missiles to Cuba had turned around on the morning of October 23 the Foxtrot submarines kept sailing westward. The four submarines had left their base on the Kola Peninsula on October 1. They had been tracked by various means as they crossed the Atlantic. Their diesel engines were easy to detect and their daily communication with Moscow was intercepted. It was the first time Soviet submarines had sailed so close to the East Coast of the United States and it alarmed CINCLANT Admiral Robert L. Dennison. Dennison compared it to the land-based missiles in Cuba and believed, "it demonstrates a clear cut Soviet intent to position a major offensive threat off our shores."[141]

Originally in May 1962 the Soviets planned for a naval base at Mariel in Cuba that included cruisers, destroyers, a submarine squadron and other smaller and supporting vessels. The squadron would be comprised of seven Golf 1 diesel-electric submarines (Project 629), each carrying three R-13 (SS-N-4 Sark) ballistic missiles, and four Foxtrot submarines (Project 641) with a compliment of torpedoes. Plans to send the cruisers, destroyers and Golf 1s were cancelled but the B-4, B-36, B-59 and B-130 Foxtrot submarines left their Northern Fleet base on October 1st. Each submarine carried 22 torpedoes, one of which was nuclear tipped.

The U.S. Navy tracked the submarines but were ordered not to attack them. Rather the Navy was instructed to signal the submarines to surface first by dropping grenades and then practice depth charges. The communication, "Submarine Surfacing and Identification Procedures" was sent by the Pentagon to Moscow so that they could inform the submarines that they were not under attack. The messages to the submarines never got through and the captains and crew, under great stress and physical discomfort from weeks under sea, believed that perhaps war had broken out.

On October 27, probably the most dangerous day of the crisis, the firing of a nuclear torpedo almost occurred. According to the communication intelligence officer, Vadim Orlov, Captain Valetin Savitsky, unable to communicate with Moscow, "'became furious' and ordered the nuclear torpedo to be assembled for battle readiness," roaring 'We're going to blast them now! We will die, but we will sink them all -- we will not disgrace our Navy."[142] Fellow officers eventually calmed Captain Savitskiy down and the submarine surfaced. The incident is one more example of a nuclear weapon almost being used that would likely have led to a far different outcome.

A U.S. U-2 and Soviet Air Space

On October 27, a U-2 on an air sampling mission to the North Pole inadvertently crossed the Soviet border as the pilot lost track of his location. At least six Soviet interceptors took off with orders to shoot down the intruder. After finally overcoming his disorientation the pilot turned the U-2 to the east. SAC asked Alaskan Air Command to scramble a pair of F-102 interceptors to provide

protection for the U-2.[143] The F-102s at Galena AFB were armed with nuclear Falcon air-to-air missiles. Fortunately they never encountered the MiGs and escorted the U-2 back to an Alaskan airstrip. Had the F-102s come within range and fired their Falcons to protect the U-2 the nuclear threshold was crossed and a different scenario would have unfolded.

Endnotes

* I would like to thank Timothy McDonnell, William Burr and Michael Dobbs for reading earlier drafts of this report. The report should be considered a work in progress and I welcome corrections.

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[1] How close is an ongoing research topic. One reviewer concludes, "the crisis, while inherently dangerous, did not bring the world to the brink of nuclear war. . . . Recent information on both American and Soviet behavior during the crisis suggests that the danger of nuclear war was not as great as once thought." Robert A. Devine, "Alive and Well: The Continuing Cuban Missile Crisis Controversy," Review Essay, *Diplomatic History*, (Fall 1994), p. 557. A more persuasive argument is Michael Dobbs, *One Minute to Midnight: Kennedy, Khrushchev, and Castro on the Brink of Nuclear War* (New York: Alfred A. Knopf, 2008). See also Marc Trachtenberg, "The Influence of Nuclear Weapons in the Cuban Missile Crisis," *International Security*, Vol. 10, No. 1 (Summer 1985), pp. 137-163.

[2] Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993), pp. 62-63. Raymond Garthoff, *Reflections on the Cuban Missile Crisis,* revised edition (Washington, DC: Brookings Institution Press, 1989).

[3] The aftermath has received some scholarly attention. David G. Coleman, *The Fourteenth Day: JFK and the Aftermath of the Cuban Missile Crisis* (New York: W.W. Norton & Company, 2012); David G. Coleman, The Missiles of November, December, January, February: The Problem of Acceptable Risk in the Cuban Missile Crisis Settlement, *Journal of Cold War Studies*, Vol., 9, No. 3, 2007, pp. 5-48; Sheldon M. Stern, *The Week the World Stood Still: Inside the Secret Cuban Missile Crisis* (Stanford, CA: Stanford University Press, 2005), pp. 205-211.

[4] *The Soviet Bloc Armed Forces and the Cuban Crisis, A Chronology: July - November 1962* (Washington DC: National Indications Center, June 18, 1963), p. 113.

[5] Sergo Mikoyan, *The Soviet Cuban Missile Crisis,* ed. Svetlana Savranskaya (Washington, DC: Woodrow Wilson Center Press; Stanford, CA: Stanford University Press, 2012).

[6] Sergo Mikoyan, *The Soviet Cuban Missile Crisis*, ed. Svetlana Savranskaya (Washington, DC: Woodrow Wilson Center Press; Stanford, CA: Stanford University Press, 2012).

[7] "Gribkov appears, however, to be in error in identifying the ship that withdrew the tactical nuclear warheads as *Okhotsk*, which left Cuba on 4 Dec., and Beloborodov is more likely to be correct that it was the *Arkangel'sk* departing Cuba on 1 December and arriving in the Soviet Union on December 25." Raymond L. Garthoff, "US Intelligence in the Cuban Missile Crisis," in James G. Blight and David A. Welch, *Intelligence and the Cuban Missile Crisis* (London: Frank Cass, 1998), p. 61; General Anatoli I. Gribkov, oral presentation, Woodrow Wilson Center, April 4, 1994.

[8] DIA Estimate, *Assessment of Increased Conventional Military Capabilities of Cuban and Soviet Units in Cuba*, 14 November 1962.

[9] Four of many examples: 1) The Soviet Union and Cuba believed the U.S, intended to invade Cuba and overthrow Fidel Castro. According to Robert McNamara there was no such intention. 2) The U.S. believed that the Soviets would not move nuclear warheads outside the Soviet Union; they did. 3) The Soviets believed they could secretly introduce their missiles and when their presence was disclosed the U.S. would not respond. They were wrong. 4) Some advisers who urged JFK to destroy the missiles by an

air attack and follow up with an invasion thought the Soviets would not respond with military action. At the time the U.S. thought there were 10,000 Soviet troops in Cuba. In fact there were 43,000 plus 270,000 well-armed Cuban troops who their commanders said, would "fight to the death." Robert S. McNamara, "One Minute to Doomsday," *New York Times*, October 14, 1992, A25.

There have been half-dozen major conferences devoted to the Cuban Missile Crisis.

1. March 5-8, 1987 – Hawks Cay, Florida, Hosted by Harvard University's Nuclear Crisis Project at the Center for Science and International Affairs. Participants included U.S. scholars and surviving members of the ExComm

2. October 11-13, 1987-Cambridge, MA. Participants were former ExComm members, scholars and three Soviets. Proceedings from the first two conferences were published in Blight and Welch, *On the Brink*.

3. January 27-29, 1989 – Moscow – sponsored by USSR Academy of Sciences – Cubans attended. The proceedings published in Back to the Brink, Bruce J. Allyn, James G. Blight and David A. Welch, eds., *Back to the Brink* (CSIA Occasional Paper No. 9: December 1990).

4. January 3-7, 1991 – on Antigua, attended by American, Soviet, and Cuban officials.

5. January 9-12, 1992- Havana, Castro attended all four days.

6. October 11-12, 2002 – Havana – see http://www.gwu.edu/~nsarchiv/nsa/cuba_mis_cri/

[11] Mark Kramer argues that strict control from Moscow was always maintained and that no pre-delegation was ever provided to General Issa Pliyev, commander of Soviet forces in Cuba, to use tactical nuclear weapons independently. "Tactical Nuclear Weapons, Soviet Command Authority, and the Cuban Missile Crisis," *Cold War International History Project Bulletin*, (Fall 1993), pp. 40, 42-46. James G. Blight, Bruce J. Allyn, and David A. Welch, "Kramer vs. Kramer: Or, How can you Have Revisionism in the Absence of Orthodoxy?" *Cold War International History Project Bulletin*, (Fall 1993), pp. 41, 47-50.

[12] Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993).

[13] Paul Bracken, *The Command and Control of Nuclear Forces* (New Haven: Yale University Press, 1983).

[14] *The Soviet Bloc Armed Forces and the Cuban Crisis, A Chronology: July - November 1962* (Washington DC: National Indications Center, June 18, 1963), p. 52.

[15] *The Soviet Bloc Armed Forces and the Cuban Crisis, A Chronology: July - November 1962* (Washington DC: National Indications Center, June 18, 1963), pp. 63, 120.

[16] Quoted in Fred Kaplan, *The Wizards of Armageddon* (New York: Simon & Schuster, Inc., 1983), p. 305 and in Dobbs, *One Minute*, p. 250.

[17] Andres Wenger, *Living with Peril: Eisenhower, Kennedy, and Nuclear Weapons* (Lanham, MD: Rowman & Littlefield Publishers, Inc., 1997), p. 303.

[18] Robert S. Norris and Hans M. Kristensen, Global Nuclear Weapons Inventories, 1945-2010, *Bulletin of the Atomic Scientists,* July/August 2010, pp. 77-83; NRDC, Archive of Nuclear Data at http://www.nrdc.org/nuclear/nudb/datab9.asp and http://www.nrdc.org/nuclear/nudb/datab10.asp

[19] General Anatoli I. Gribkov and General William Y. Smith, *Operation Anadyr: U.S. and Soviet Generals Recount the Cuban Missile Crisis* (Chicago: edition q, inc.: 1994), pp. 10-11.

[20] Scott D. Sagan, "SIOP-62: The Nuclear War Plan Briefing to President Kennedy," *International Security* (Summer 1987), p. 25.

[21] David Alan Rosenberg, "'A Smoking Radiating Ruin at the End of Two Hours:' Documents on American Plans for Nuclear War with the Soviet Union, 1954-56," *International Security*, Vol. 6, No. 3 (Winter 1981-82), p. 11. The phrase was used in a March 1954 briefing at SAC Headquarters.

[22] Robert Standish Norris, *United States Nuclear Weapons Deployments Abroad, 1950-1977*, History of the Nuclear Age Dinner Series, (Washington, DC: Carnegie Endowment for International Peace, November 30, 1999).

[23] The *Forrestal* and *Franklin D. Roosevelt* were in the Mediterranean. Norman Polmar and John D. Gresham, *DEFCON-2: Standing on the Brink of Nuclear War during the Cuban Missile Crisis* (Hoboken, NJ: John Wiley & Sons, 2006), p. 16.

[24] A Pentagon study later estimated that for 1962 these included 528 SS-4s (492 at soft sites and 36 at hard sites) and 28 SS-5s at soft sites. *A History of Strategic Arms Competition, 1945-1972* (Washington, DC: USAF, June 1976), Volume 3, Chapter 3, pp. 111 and 122. Zaloga estimates 458 SS-4s and 28 SS-5s for 1962. Steven J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000* (Washington and London: Smithsonian Institution Press, 2002), p. 243.

[25] "US contingency plans with respect to Cuba have been reviewed by the Joint Staff and CINCLANT in light of the military buildup and recent intelligence. It has been concluded that, despite the very substantial increase in Cuban combat capability, CINCLANT OPLAN 316-62, in a non-nuclear environment and when preceded by CINCLANT 312-62, is considered a workable plan." DIA Estimate: *Assessment of increased Conventional Military Capabilities of Cuban and Soviet Units in Cuba*, 14 November 1962, p. 1.

[26] Strategic Air Command, *Strategic Air Command Operations in the Cuban Missile Crisis of 1962*, Historical Study No. 90, Volume 1, p. 66; Office of the Historian, *SAC Missile Chronology, 1939-1988* (Headquarters, Strategic Air Command, Offutt AFB, Nebraska, 1 May 1990); Office of the Historian, *Alert Operations and the Strategic Air Command, 1957-1991* (Headquarters, Strategic Air Command, Offutt AFB, Nebraska, 1991); Office of the Historian, *From Snark to Peacekeeper: A Pictorial History of Strategic Air Command Missiles* (Headquarters, Strategic Air Command, Offutt AFB, Nebraska, 1 May 1990).

[27] The first American ICBM equipped with a nuclear warhead was an Atlas D that went on alert on October 31, 1959 at Vandenberg, AFB, CA. The first ICBM squadron to achieve operational status was the 564 SMS at F.E. Warren AFB, WY with 6 Atlas Ds in September 1960. Operational dates from Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History, 1990), pp. 233-34. See also Bernard C. Nalty, *USAF Ballistic Missile Programs, 1962-1964* (USAF Historical Division Liaison Office, April 1966), p. 2.

[28] "As a result of the Cuban missile crisis during the latter part of the month, the Series F Atlas squadrons at Schilling (550th), Lincoln ((551st), Altus (577th), and Dyess (578th) were for the first time required to place all twelve missiles on alert. The first few Series F Atlas ICBMs at the 556th SMS at Plattsburg AFB, New York, were also put on alert at this time." Office of the Historian, *SAC Missile Chronology, 1939-1988* (Headquarters, Strategic Air Command, Offutt AFB, Nebraska, 1 May 1990). The status of the 12 Atlas Fs at Walker AFB, NM during the October period is unclear. On 20 December SAC declared the

556th SMS at Plattsburgh operational competing deployment of the Atlas ICBM force. There were also eleven Atlas launchers at Vandenberg, AFB, CA: 6 Atlas D (576 A and B), 2 Atlas E (576-C and F) and 3 Atlas F (576-D, E and G).

[29] "On October 22, 1962, when DEFCON 3 was ordered, some of the test silos and gantries contained research and development missiles, and others were in various states of repair, but immediately AFSC and contractor personnel began to prepare the sites for Emergency Combat Capability status. Operational Atlas, Titan, and Minuteman test flight missiles were quickly prepared to permit launches against 'the Sino-Soviet Bloc': SIOP war plan targets were assigned and programmed into the systems, and munitions maintenance personnel replaced the test reentry vehicles with nuclear warheads. The first missile, an Atlas F ICBM, was placed on full alert on October 23 and the AFSC and civilian contractor personnel working in the launch control facility were replaced by a SAC combat crew. By October 30, crews had placed nuclear warheads onto nine missiles at Vandenberg." Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993), p. 79.

[30] History of 6595th Aerospace Test Wing, 22 October 1962 – 20 November 1962, p. 2. See also the Vandenberg AFB Launch History at http:www.spacearchive.info/vafblog.htm

[31]Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History, 1990), p. 236. No Titan II ICBMs were available by October 1962. The three squadrons (54 Titan II ICBMs) achieved operational status between June and December 1963 in six squadrons at three Air Force bases. Eighteen ICBMs were emplaced in vertical silos at Davis-Monthan AFB, AZ, at McConnell AFB, KS, and at Little Rock AFB, AK.

[32] Kennedy's use of the phrase "ace in the hole" is apocryphal. To correct the record see Major (Ret) Greg Ogletree, "The 'Hole' Story," *Association of Air Force Missileers Newsletter*, Vol. 18, No. 2 (June 2010), pp. 7-10.

[33] On December 11, 1963 SAC declared the first two flights of the model A Minuteman I (i.e., 20 missiles) operational.

[34] History of 6595th Aerospace Test Wing, 22 October 1962 – 20 November 1962, p. 10.

[35] Ray S. Cline, "Nuclear War Seemed Remote, *Washington Post*, February 5, 1989, p. D7.

[36] General Anatoli I. Gribkov and General William Y. Smith, *Operation Anadyr: U.S. and Soviet Generals Recount the Cuban Missile Crisis* (Chicago: edition q, inc.: 1994), pp. 10-11.

[37] Strategic Air Command, *Strategic Air Command Operations in the Cuban Missile Crisis of 1962*, Historical Study No. 90, Volume 1, p. 65.

[38] Duncan Campbell, *The Unsinkable Aircraft Carrier: American Military Power in Britain* (London: Michael Joseph, 1984), pp. 205-231

[39] A second SSBN base was later located at Rota, Spain (1964-1979) and a third established at Guam (1964-1981) to cover Soviet targets in the Pacific region. The USS Sam Houston (SSBN 609), first Polaris

submarine assigned to Mediterranean patrol, visited Izmir, Turkey on 14 April 1963. This was the first foreign port, other than Holy Loch, visited by an SSBN and was surely sent to fill the void of the withdrawn Jupiters.

[40] The arrival dates of the first five submarines to Holy Loch were: SSBN 599 (March 8, 1961), SSBN 598 (April 25, 1961), SSBN 601 (July 9, 1961), SSBN 600 (September 23, 1961), SSBN 602 (October 1961).

[41] R.A. Fuhrman, *The Fleet Ballistic Missile System Polaris to Trident* (von Karman Lecture for 1978).

[42] VADM Charles H. Griffiths, "Role of Polaris Submarines in the Cuban Missile Crisis," U.S. Naval Academy Alumni Association and Foundation, https://www.usna.com/SSLPage.aspx?pid+2861

[43] VADM Charles H. Griffiths, "Role of Polaris Submarines in the Cuban Missile Crisis," U.S. Naval Academy Alumni Association and Foundation, https://www.usna.com/SSLPage.aspx?pid+2861

[44] Curtis A. Utz*, Cordon of Steel: The U.S. Navy and the Cuban Missile Crisis,* No. 1 in The U.S. Navy in the Modern World Series (Washington, DC: Naval Historical Center, 1993), p. 22, p. 28.

[45]JCS message to the Secretary of State, No.6968, October 25, 1962 in http://www.alternatewars.com/WW3/Cuba/Cuba_1962_OOB.htm. Hereafter, JCS message 6968.

Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993), p. 62, fn 22.

[46] VADM Charles H. Griffiths, "Role of Polaris Submarines in the Cuban Missile Crisis," U.S. Naval Academy Alumni Association and Foundation, https://www.usna.com/SSLPage.aspx?pid+2861

[47] The USS Daniel Boone (SSBN 629) departed Apra Harbor, Guam on December 25, 1964, with 16 Polaris A-3 missiles to begin the first operational patrol in the Pacific.

[48] David K. Stumpf, *Regulus: The Forgotten Weapon* (Paducah, Turner Publishing Company, 1996), p. 121.

[49] David K. Stumpf, *Regulus: The Forgotten Weapon* (Paducah, Turner Publishing Company, 1996), p. 132.

[50] David K. Stumpf, *Regulus: The Forgotten Weapon* (Paducah, Turner Publishing Company, 1996), pp. 138-139.

[51] Scott D. Sagan, "SIOP-62: The Nuclear War Plan Briefing to President Kennedy," *International Security* (Summer 1987), p. 39.

[52] For background on SIOP-62 and its origins see David A. Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy, 1945-1960," *International Security* 7 (1983); Scott D. Sagan, "SIOP-62: The Nuclear War Plan Briefing to President Kennedy," *International Security* (Summer 1987), p. 39; Desmond Ball, "The Development of the SIOP, 1960-1983" in Desmond Ball and Jeffrey Richelson, eds., *Strategic Nuclear Targeting* (Ithaca: Cornell University Press, 1986), pp. 57-83. See also JSTPS/JSMH, *Unclassified History of the Joint Strategic Target Planning Staff (JSTPS)*, Prepared by Charles K. Hopkins (15 March 1989).

[53] For basic information on SIOP-63, see National Security Archive Electronic Briefing Book No. 236, William Burr, ed., "New Evidence on the Origins of Overkill," http://www.gwu.edu/~nsarchiv/nukevault/ebb236/index.htm. In January 1963, 4100 weapons were assigned 1250 DGZs. Tabs A and B, Nuclear Forces of the Alliance and SACEUR Threat List, 28 January 1963, National Archives, RG 59, Policy Planning Council Records, 1963-1964, box 281, Europe1963-1964. The Bundy quote is cited in Fred Kaplan, "JFK's First-Strike Plan," *The Atlantic Monthly* (October 2001), pp. 81-86.

[54]Scott D. Sagan, "SIOP-62: The Nuclear War Plan Briefing to President Kennedy," *International Security* (Summer 1987), p. 25.

[55] Memo, Carl Kaysen to General Maxwell Taylor, Strategic Air Planning and Berlin, September 5, 1961. Available at the National Security Archive Website. http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB56/

[56] David Rosenberg, "Constraining Overkill, Contending Approaches to Nuclear Strategy, 1955-1965" (Naval Historical Center, Colloquium on Contemporary History No. 9, "More Bang for the Buck: U.S. Nuclear Strategy and Missile Development, 1945-1965," January 12, 1994), http://www.history.navy.mil/colloquia/cch9b.html

[57] *Alert Operations and the Strategic Air Command, 1957-1991* (Office of the Historian, Headquarters SAC, Offutt AFB, NE, 7 December 1991); Strategic Air Command, *Strategic Air Command Operations in the Cuban Missile Crisis of 1962*, Historical Study No. 90, Volume 1, pp. 43-48.

[58] *Alert Operations and the Strategic Air Command, 1957-1991* (Office of the Historian, Headquarters SAC, Offutt AFB, NE, 7 December 1991.

[59] Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993), pp. 170-173.

[60] Strategic Air Command, *Strategic Air Command Operations in the Cuban Missile Crisis of 1962*, Historical Study No. 90, Volume 1, p. 39; Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993), pp. 63-65.

[61] Strategic Air Command, *Strategic Air Command Operations in the Cuban Missile Crisis of 1962*, Historical Study No. 90, Volume 1, p. 43.

[62] Strategic Air Command, *Strategic Air Command Operations in the Cuban Missile Crisis of 1962*, Historical Study No. 90, Volume 1, p. 48.

[63] USAF Historical Division Liaison Office, *The Air Force Role in Five Crises*,

[64] On October 27 the first model A Minuteman I ICBMs were placed on alert at the 10th Strategic Missile Squadron (10 SMS), 341st Strategic Missile Wing (341 SMW), Malmstrom AFB, Montana. Over the next seven weeks they continued to be emplaced and made operational. On December 11, 1962 SAC headquarters declared two flights (20 ICBMs) to be operational. Office of the Historian, *SAC Missile Chronology, 1939-1988* (Headquarters, Strategic Air Command, Offutt AFB, Nebraska, 1 May 1990).

[65] Strategic Air Command, *Strategic Air Command Operations in the Cuban Missile Crisis of 1962*, Historical Study No. 90, Volume 1, p. 58.

[66] USAF Historical Division Liaison Office, *The Air Force Response to the Cuban Crisis, p. 11;* USAF Historical Division, The Air Force Role in Five Crises: 1958-1965, p. 43.

[67] Dobbs, *One Minute*, pp. 95-96.

[68] Aircraft carriers were removed from the SIOP in 1976. VADM Gerald E Miller, USN (Ret), *Nuclear Weapons and Aircraft Carriers* (Washington, DC: Smithsonian Institution Press, 2001), p. ?

[69] JCS message No. 6968. Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993), fn 23, p. 63.

[70] JCS Message 6968.

[71] Pavel Podvig, ed., *Russian Strategic Nuclear Forces* (Cambridge, MA: The MIT Press, 2001); Thomas B. Cochran, William M. Arkin, Robert S. Norris, Jeffrey I. Sands, *Nuclear Weapons Databook*, Volume IV *Soviet Nuclear Weapons* (New York: Harper & Row, Ballinger Division, 1989).

[72] Raymond Garthoff, The Meaning of the Missiles," *Washington Quarterly*, Vol. 5, No. 4 (Autumn 1982), pp. 76-82. It was declassified 20 November 1981.

[73] Bill Keller, "Warheads Were Deployed in Cuba in '62, Soviets Say, "*New York Times*, January 29, 1989, p. 1.

[74] Steven J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000* (Washington and London: Smithsonian Institution Press, 2002), esp. pp. 82-87.

[75] I would like to thank Michael Dobbs for sharing with me Lt. Col. Sergei Karlov's notes on ICBM deployments. See also Dobbs, *One Minute*, p. 190 and footnote 189 on p. 386.

[76] Dobbs, *One Minute*, p. 188.

[77] An assessment by the Pentagon done soon afterwards concluded, "There is virtually no available evidence as to whether the rocket troops were or were not brought to the level of readiness claimed by the USSR." *The Soviet Bloc Armed Forces and the Cuban Crisis: A Discussion of Readiness Measures* (Washington, DC: National Indications Center, July 15, 1963), p. 21.

[78] Pavel Podvig, ed., *Russian Strategic Nuclear Forces* (Cambridge, MA:, The MIT Press, 2001), pp. 179-182.

[79] Dobbs, *One Minute*, p. 189; Steven J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000* (Washington and London: Smithsonian Institution Press, 2002), esp. pp. 60-66, 232.

[80] Pavel Podvig, ed., *Russian Strategic Nuclear Forces* (Cambridge, MA:, The MIT Press, 2001), pp. 189-192; Steven J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000* (Washington and London: Smithsonian Institution Press, 2002), esp. pp. 61-70, 232.

[81] Norman Polmar, The Soviet Navy's Caribbean Outpost," *Naval History Magazine* (October 2012). The first test of the R-13 missile with a nuclear warhead was conducted on 20 October 1961 at the Novaya Zemlya test range with an estimated yield of 1.45 Mt. Pavel Podvig, ed., *Russian Strategic Nuclear Forces* (Cambridge, MA: 2001), p. 238.

[82] Scott D. Sagan, "SIOP-62: The Nuclear War Plan Briefing to President Kennedy," *International Security* (Summer 1987), pp. 27-28.

[83] Scott D. Sagan, "SIOP-62: The Nuclear War Plan Briefing to President Kennedy," *International Security* (Summer 1987), fn 16, p. 27.

[84] Pavel Podvig, *Russian Strategic Weapons*, p. 4

[85] Andres Wenger, *Living with Peril: Eisenhower, Kennedy, and Nuclear Weapons* (Lanham, MD: Rowman & Littlefield Publishers, Inc., 1997), p. 295.

[86] Two other reasons are generally mentioned as to why Khrushchev decided to deploy ballistic missile to Cuba: to redress an imbalance in strategic weapons and, to deter a U.S. invasion and prevent the loss of Cuba. Andres Wenger, *Living with Peril: Eisenhower, Kennedy, and Nuclear Weapons* (Lanham, MD: Rowman & Littlefield Publishers, Inc., 1997), pp. 279-83.

[87] Philip Nash, *The Other Missiles of October: Eisenhower, Kennedy, and the Jupiters, 1957-1963* (Chapel Hill: The University of North Carolina Press, 1997).

[88] Earlier plans called for five additional Thor squadrons tentatively earmarked for Italy, Turkey, Okinawa, and Alaska. Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History, 1990), p. 223.

[89] Stephen Twigge and Len Scott, "The Other Missiles of October: The Thor IRBMs and the Cuban Missile Crisis," *Electronic Journal of International History*, Article 3. Online at

http://www.history.ac.uk/resources/e-journal-international-history/twigge-paper#top

[90] Barton J. Bernstein, "Reconsidering the Missile Crisis: Dealing with the Problems of the American Jupiters in Turkey," in James A. Nathan, ed., *The Cuban Missile Crisis Revisited* (New York: St. Martin's Press, 1992), pp. 55-129.

[91] Earlier plans called for deployment of three squadrons of Jupiter missiles to France. When Gen. Charles DeGaulle assumed power in June 1958 he refused to accept the Jupiters. The Eisenhower administration and the Air Force considered sites in Greece, Spain, West Germany, Okinawa and Alaska with the number of squadrons fluctuating. Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History, 1990), p. 223; Nash, *Other Missiles*, pp. 34-75. Eventually Italy and Turkey were chosen.

[92] Nash has the first Launch Position/Squadron (1/1) operational in February 1961 (eight months behind schedule, after JFK was sworn in) and the 10th and last Launch Position/Squadron operational in July 1961. *Other Missiles*, p. 79. See also Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History, 1990), p. 186.

[93] Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History, 1990), p. 233.

[94] "The first surface shipment of Jupiter equipment did not leave for Turkey until 23 January (arriving 11 February), and on 10 February the USAF reported that the deployment was 'in the preliminary construction phase.'" Nash, *Other Missiles*, p. 80.

[95] Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History, 1990), p. 227.

[96] Nash, *Other Missiles*, p. 103.

[97] Bernstein believes the date cited in the SAC Missile Chronology 1939-1988 (Office of the Historian, Headquarters Strategic Air Command, Offutt AFB, NE: 1 May 1990) of May 25, 1962 is a mistake and thinks the correct date is either October 19 or 22, 1962 when the first Jupiter missiles were turned over to the Turkish Air Force. Bernstein, "Reconsidering the Missile Crisis," p. 117, fn 84. A USAFE history confirms Bernstein's suspicion. "SM-78 Jupiter Intermediate Range Ballistic Missile launch position

number 4 was turned over by USAFE to the Turkish Air Force on 22 October [1962] for maintenance and operation. This was the first Jupiter launch position to be assigned to the Turks." R. Bruce Harley, *Historical Highlights: United States Air Forces in Europe, 1945-1973* (Office of History, USAFE, 10 May 1974), p. 55. Dobbs agrees on the date. "U.S. Air Force officers retained control over the warheads, but the missiles themselves were transferred to Turkish custody on October 22, the very day that Kennedy went on television to announce the blockade of Cuba." *One Minute*, p. 234.

[98] Barton J. Bernstein, "Reconsidering the Missile Crisis: Dealing with the Problems of the American Jupiters in Turkey," in James A. Nathan, ed., *The Cuban Missile Crisis Revisited* (New York: St. Martin's Press, 1992), p. 98.

[99]Steven Zaloga, "The Missiles of October: Soviet Ballistic Missile Forces During the Cuban Crisis," *Journal of Soviet Military Studies*, June 1990, p. 321, citing Penkovskiy.

[100] Dobbs, *One Minute*, p. 270.

[101] Nash, *Other Missiles*, pp. 111-112.

[102] Barton J. Bernstein, "Reconsidering the Missile Crisis: Dealing with the Problems of the American Jupiters in Turkey," in James A. Nathan, ed., *The Cuban Missile Crisis Revisited* (New York: St. Martin's Press, 1992), p.99.

[103] USAF Historical Division, Liaison Office, *The Air Force Role in Five Crises*, p. 40.

[104] Dobbs, *One Minute*, p. 251.

[105] Letter, Harold M. Agnew to Major General A.D. Starbird, January 5, 1961, with Attachment I, The NATO Custody Control Problem.

[106] Agnew, The NATO Custody Control Problem.

[107] There were British planes on QRA. On October 28 orders were given to increase the number from nine to twenty-one. L.V. Scott, Macmillan, *Kennedy, and the Cuban Missile Crisis: Political, Military and Intelligence Aspects* (New York: Palgrave, 1999, p. 144).

[108] JCS Message 6968 lists the following for Europe:

27 F-100 Super Sabre (1 B7, B28, B43)
9 F-101 Voodoo (1 B7, B28, B43)
15 F-105 Thunderchief (1 B28 or B43 internal or 2 B28 or B43 external)
2 A3J Vigilante (1 B27, B28, B43, B57 or 2 B43)
4 A4D/FJ4 Skyhawk/Fury (1 nuclear bomb)
4 AD Skyraider (1 nuclear bomb)
3 Valiant (2 B28)
10 F-84 F Thunderstreak (1 nuclear bomb)
4 B-57 Canberra (1 nuclear bomb)
37 Jupiter
48 Mace

[109] Steven Zaloga, The Missiles of October: Soviet Ballistic Missile Forces During the Cuban Crisis," *Journal of Soviet Military Studies*, Vol. 3, No. 2 (June 1990), p. 309. "The Soviets have deployed over 500 MRBMs and IRBMs on their own territory . . ." Raymond Garthoff, "The Meaning of the Missiles,"

Washington Quarterly, Vol. 5, No. 4 (Autumn 1982), p. 79; A History of Strategic Arms Competition, 1945-1972, Volume 3, p. 111.

[110] A History of Strategic Arms Competition, 1945-1972, Volume 3, p. 122. IOC at hard sites would not begin until early 1963. Eventually in 1964 101 SS-5s would be deployed

[111] Norman Polmar and John D. Gresham, *DEFCON-2: Standing on the Brink of Nuclear War during the Cuban Missile Crisis* (Hoboken, NJ: John Wiley & Sons, 2006), esp. pp. 51-68 and passim.

[112] For a spirited debate see, Mark Kramer, "Tactical Nuclear Weapons, Soviet Command Authority, and the Cuban Missile Crisis," *Cold War International History Bulletin*, Issue 3 (Fall 1993), pp. 40, 42-46 and James G. Blight, Bruce J. Allyn, and David A. Welch, "Kramer Vs. Kramer, *Cold War International History Project Bulletin*, Issue 3 (Fall 1993), pp. 41, 47-50.

[113] Zaloga, *Kremlin's Nuclear Sword*, p. 87.

[114] Dobbs, *One Minute*, p. 247.

[115] Steven Zaloga, "The Missiles of October: Soviet Ballistic Missile Forces During the Cuban Crisis," *Journal of Soviet Military Studies*, June 1990, p. 317.

[116] Dobbs, *One Minute*, pp. 86-89.

[117] The Group of Soviet Forces in Cuba – October 1962 (Final Planned Table of Organization) in Norman Polmar and John D. Gresham, *DEFCON-2: Standing on the Brink of Nuclear War during the Cuban Missile Crisis* (Hoboken, NJ: John Wiley & Sons, 2006), p. 52.

[118] Norman Polmar and John D. Gresham, *DEFCON-2: Standing on the Brink of Nuclear War during the Cuban Missile Crisis* (Hoboken, NJ: John Wiley & Sons, 2006), p. 67. Also aboard were thirty-six warheads for re FKR-1 cruise missiles, twelve warheads for the FROG tactical ballistic missiles and six gravity bombs for the Il-28 Beagle bombers.

[119] At the time U.S. intelligence credited the SS-4 with a maximum range of 1,020 statute miles (1,670 km) off by 22 percent. Norman Polmar and John D. Gresham, *DEFCON-2: Standing on the Brink of Nuclear War during the Cuban Missile Crisis* (Hoboken, NJ: John Wiley & Sons, 2006), p. xxiii. General Gribkov gives the range as 1,400 miles. General Anatoli I. Gribkov and General William Y. Smith, *Operation Anadyr: U.S. and Soviet generals Recount the Cuban Missile Crisis* (Chicago: edition q, inc.: 1994), p. 13.

[120] Zaloga, Journal, p. 315. William Kaufmann calculated that thirty-four out of seventy-six SAC bomber bases were within range of the SS-4s and most of the other bases were within range of the SS-5s. Dobbs, *One Minute*, p. 98.

[121] Zaloga, *Journal* p. 318; Zaloga, *Kremlin's Nuclear Sword,* p. 87.

[122] At the time the U.S. intelligence community estimated that the SS-5 had a maximum range of 2,200 statute miles (3600 kms). Norman Polmar and John D. Gresham, *DEFCON-2: Standing on the Brink of Nuclear War during the Cuban Missile Crisis* (Hoboken, NJ: John Wiley & Sons, 2006), p. xxiii. General Gribkov gives the range at 2,800 miles. General Anatoli I. Gribkov and General William Y. Smith, *Operation Anadyr: U.S. and Soviet generals Recount the Cuban Missile Crisis* (Chicago: edition q, inc.: 1994), p. 13.

[123] Zaloga underestimates the range by 425 kilometers, *Journal*, pp. 315, 317.

[124] Dobbs, *One Minute*, p. 256.

[125] Dobbs, *One Minute*, p. 247.

[126] Steven J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000* Washington: Smithsonian Institution Press, 2002), pp. 85-86.

[127] General Gribkov quoted in Neil Sheehan, *A Fiery Peace in a Cold War* (New York: Random House: 2009), p. 446.

[128] Norman Polmar and John D. Gresham, *DEFCON-2: Standing on the Brink of Nuclear War during the Cuban Missile Crisis* (Hoboken, NJ: John Wiley & Sons, 2006), p. 61.

[129] Michael Dobbs, *One Minute to Midnight: Kennedy, Khrushchev, and Castro on the Brink of Nuclear War* (New York: Alfred A. Knopf, 2008), pp. 125, 205-206.

[130] USAF Historical Division Liaison Office, *The Air Force Response to the Cuban Crisis*, p. 6; Christopher J. Bright, *Continental Defense in the Eisenhower Era: Nuclear Antiaircraft Arms and the Cold War* (New York: Palgrave Macmillan, 2010), pp. 152-159; David F. Winkler, *Searching the Skies: The Legacy of the United States Cold War Defense Radar Program* (USAF Air Combat Command, June 1997), esp., pp. 37-56.

[131] USAF Historical Division Liaison Office, *The Air Force Role in Five Crises, 1958-1965*, p. 41.

[132] USAF Historical Division Liaison Office, *The Air Force Response to the Cuban Crisis, 1958-1965,* p. 8.

[133] USAF Historical Division Liaison Office, *The Air Force Response to the Cuban Crisis, 1958-1965,* p. 12.

[134] USAF Historical Division Liaison Office, *The Air Force Role in Five Crisis: 1958-1965*, p. 39; USAF Historical Division Liaison Office, *The Air Force Response to the Cuban Crisis, pp. 6-7*

[135] Dobbs, *One Minute*, p. 249.

[136] USAF Historical Division Liaison Office, *The Air Force Response to the Cuban Crisis, 11.* Plans went back and forth. After the discovery of Ilyushin bombers and FROG missiles on October 25 U.S. invasion plans were revised to include use of tactical nuclear weapons such as Honest John missiles.

[137] Dobbs, *One Minute*, pp. 251-53.

[138] Zaloga, *Kremlin's Nuclear Sword*, p. 83.

[139] Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993), pp. 79-80. Emphasis in original.

[140] William Burr and Thomas S. Blanton, eds., The Submarines of October: U.S. and Soviet Naval Encounters During the Cuban Missile Crisis, National Security Archive Electronic Briefing Book No. 75, October 31, 2002, http://www.gwu.edu/~nsarchiv/nsa/cuba_mis_cri/; Svetlana Savranskaya, "New Sources on the Role of Soviet Submarines in the Cuban Missile Crisis, *Journal of Strategic Studies*, Vol. 28, No. 2 (2005), pp. 233-259

[141] Dobbs, *One Minute*, p. 92.

[142] William Burr and Thomas S. Blanton, eds., The Submarines of October: U.S. and Soviet Naval Encounters During the Cuban Missile Crisis, National Security Archive Electronic Briefing Book No. 75, October 31, 2002, http://www.gwu.edu/~nsarchiv/nsa/cuba_mis_cri/; Svetlana Savranskaya, "New Sources on the Role of Soviet Submarines in the Cuban Missile Crisis, *Journal of Strategic Studies*, Vol. 28, No. 2 (2005), p. 246.

[143] Dobbs, *One Minute*, p. 264.