U. S. NUCLEAR WEAPONS ACCIDENTS

by Jaya Tiwari and Cleve J. Gray

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Inadvertent Explosion:
"Nuclear weapons are designed with great care to explode only when deliberately armed and fired. Nevertheless, there is always a possibility that, as a result of accidental circumstances, an explosion will take place inadvertently. Although all conceivable precautions are taken to prevent them, such accidents might occur in areas where weapons are assembled and stored, during the course of loading and transportation on the ground, or when actually in the delivery vehicle, e.g., an airplane or a missile."

-Atomic Energy Commission/Department of Defense, *The Effects of Nuclear Weapons, 1962*.

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As U.S. policymakers and the media continue to ponder the threat posed by the proliferation of nuclear weapons into the 21st century, questions regarding the utility of these weapons will repeatedly surface. Moral and ethical aversions against these weapons aside, their military utility has been questioned by opponents of nuclear weaponry because of their destructive capabilities and the disastrous consequences in the rare event of an accident. The operational risks associated with nuclear weapons jeopardize the safety and well-being of numerous civilians as well as military personnel.

The history of U.S. nuclear weapon accidents is as old as their introduction into the American military arsenal. The first known, officially acknowledged accident occurred in February 1950, when an American B-36 bomber jettisoned a bomb into the Pacific Ocean. The record of these accidents, however, has been beset with mysteries and inconsistencies due to a lack of documentation available to the public. The paucity of publicly available data is largely the result of the highly classified nature of information regarding nuclear weapons and their location. To maintain this opacity, the U.S. military's policy is to *neither confirm nor deny* the presence of nuclear weapons in most accidents.

Despite claims that the U.S. nuclear stockpile is safe and reliable, the number of accidents

involving America's atomic arsenal is a matter of concern. The Department of Defense (DoD) first published a list of nuclear weapon accidents in1968 which detailed 13 serious nuclear weapon accidents between 1950-1968. An updated and revised list released in 1980 catalogued 32 accidents between1950-1980. However, this second compilation failed to include some of the accidents covered in the 1968 list.

Even the updated estimate does not tell the entire story, for no additional list of nuclear weapon accidents acknowledged by the Pentagon has been released since 1980. Moreover, the list included only those instances that were judged severe enough to fit the Pentagon's conservative definition of a nuclear weapon "accident." Many more mishaps which could have been catastrophic were excluded as "nuclear weapons incidents."

Further blurring the picture are major discrepancies in the way different military branches report nuclear weapon accidents or incidents. For example, according to a General Accounting Office (GAO) report entitled Navy Nuclear Weapons Safeguards and Nuclear Weapon Accident Emergency Planning, a total of 563 nuclear weapon incidents were reported by the Navy between 1965-1983. However, the report creates some uncertainty by noting that "of the 563 nuclear weapon incidents reported, 330 involved no weapon or the weapon or component involved were non-nuclear." The report does not provide any explanation of this discrepancy although a number of plausible explanations exist. For instance, the Navy could have included 330 security breaches in its overall total. Nevertheless, even if these 330 incidents are not considered "accidents," 233 nuclear weapons incidents are publically documented during the 18 year period covered by this report. At the same time, documents released by the Navy under the Freedom of Information Act cite 381 nuclear weapon incidents between 1965 and 1977.

While studies by non-governmental organizations such as Greenpeace often cite many more accidents, even DoD's conservative estimates document that at least one serious nuclear weapon accident occurred every year. This should give pause to any policymaker considering the future utility of nuclear arsenals.

Listed below are accidents involving U.S. nuclear weapons. Although the list is far from complete, it includes all accidents that can be verifiably documented and corroborated from more than one source. Accidents which have not been acknowledged or verified from government sources are marked by an asterisk (*) and the source(s) of information provided. This list includes nuclear weapon accidents involving the Air Force, Navy and the Department of Energy (DoE). There is no public information available about nuclear weapon accidents involving the Army.

U.S. Navy's Definition of Nuclear Weapon Accident

Nucflash

- Any accidental or unauthorized incident involving a possible detonation of a nuclear weapon by U.S. Forces which could create the risk of nuclear war between the U.S. and the U.S.S.R.

Broken Arrow

- The accidental or unauthorized detonation, or possible detonation of a nuclear weapon

- The accidental or unauthorized detonation, or possible detonation of a nuclear weapon (other than war risk);
- Non-nuclear detonation or burning of a nuclear weapon;
- Radioactive contamination;
- Seizure, theft, or loss of a nuclear weapon or component (including jettisoning);
- Public hazard, actual or implied.

Bent Spear

- Any nuclear weapon significant incidents other than nuclear weapons accidents or war risk detonations, actual or possible.

Dull Sword

- Any nuclear weapon incident other than significant incidents.

Faded Giant

- Any nuclear reactor or radiological accidents involving equipment used in connection with naval nuclear reactors or other naval nuclear energy devices while such equipment is under the custody of the Navy.

DoD's Definition of Nuclear Weapon Accident

An unexpected event involving nuclear weapons or nuclear weapons components that results in any of the following:

- Accidental or unauthorized launching, firing, or use, by U.S. forces or supported allied forces, of a nuclear-capable weapon system which could create the risk of an outbreak of war;
- Nuclear detonation, non-nuclear detonation or burning of a nuclear weapon or radioactive weapon component, including a fully assembled nuclear weapon, an unassembled nuclear weapon, or radioactive nuclear weapon components;
- Radioactive contamination;
- Seizure, theft, or loss of a nuclear weapon component, including jettisoning;
- Public hazard, actual or implied.

DoD's Definition of Nuclear Weapons Incident

An unexpected event involving a nuclear weapon, facility, or component, resulting in any of the following, but not constituting a nuclear weapons accident:

- an increase in possibility of explosion or radioactive contamination;
- errors committed in the assembly, testing, loading or transportation of equipment, and or the malfunctioning of equipment and material which could lead to an unintentional operation of all or part of the weapon arming and/or firing sequence, or which could lead to a substantial change in yield, or increased dud probability;

- any act of God, unfavorable environment, or conditions resulting in damage to the weapon, facility or component.

Triggering a Nuclear Exchange

"The explosion of a nuclear device by accident--mechanical or human--could be a disaster for the United States, for its allies, and for its enemies. If one of these devices accidentally exploded, I would hope that both sides had sufficient means of verification and control to prevent the accident from triggering a nuclear exchange. But we cannot be certain that this would be the case."

- John T. McNaughton, Assistant Secretary of Defense, 1962

EXPLOSION, BURNING OR OTHER SPREAD OF FISSILE MATERIAL

(in chronological order)

August 5, 1950, Suisun Air Force Base, Fairfield, California

A B-29 bomber carrying a nuclear weapon without its fissile core crashed and burned near a trailer park occupied by 200 families. The crew experienced difficulty with the aircraft's propellers and with retracting its landing gear immediately after takeoff from Fairfield-Suisun Air Force Base (now Travis Air Force Base), eventually crashing while attempting an emergency landing.

The bomber was carrying 10-12 500 lb. conventional explosive bombs, which detonated 15 minutes after the crash. The ensuing blast was felt as far as 30 miles away and created a crater 20 yards across and six feet deep. The crash and subsequent detonation killed eighteen personnel, including Air Force General Travis, and injured 60 others.

May 22, 1957, Kirtland Air Force Base, New Mexico

A nuclear weapon without its fissile core fell from the bomb bay of a B-36 at an altitude of 1,700 feet and exploded upon impact. The bomber was transporting both the weapon and its fissile core, which had been removed for safety, from Biggs Air Force Base in Texas to Kirtland Air Force Base in New Mexico. Although parachutes attached to the weapon were deployed during its descent, they did not function properly.

The nuclear weapon was completely destroyed in the detonation which occurred approximately 4.5 miles south of the Kirtland control tower and 0.3 miles west of the Sandia Base reservation, creating a blast crater approximately 25 feet in diameter and 12 feet deep. Fragments of the bomb and debris were scattered over a one mile area. A radiological survey of the area was conducted, but revealed no radioactive contamination beyond the lip of the crater.

January 31, 1958, Unidentified Overseas Base

A B-47 bomber with one nuclear weapon in strike configuration was making a simulated takeoff during an exercise when the left rear wheel casting failed, causing the tail to strike the runway and rupturing the fuel tank. The aircraft caught fire and burned for seven hours. Although the weapon's high explosives did not detonate, there was some contamination in the area immediately surrounding the crash. Following the accident, exercise alerts were temporarily suspended.

The crash may have taken place at a U.S. airbase in Sidi Slimane, French Morocco. An earlier Air Force document reported that "contamination of the wreckage was high, but that of the surrounding area was low." A June 8, 1960, *New York Times* report mentions a nuclear weapon accident having occurred "at a United States field near Tripoli, Libya," but provides no further details.

***February 1958, Greenham Common Airbase, England**

A B-47 bomber experiencing engine trouble during takeoff jettisoned two full 1,700 gallon fuel tanks from an altitude of 8,000 feet, which missed a designated safe impact area and exploded 65 feet behind a parked B-47 loaded with nuclear weapons. The resulting fire burned for 16 hours and caused the high explosives package of at least one weapon to explode. The explosion released radioactive material, including powdered uranium and plutonium oxides, at least 10 to 20 grams of which were found off base. An adjacent hangar was also severely damaged, and other planes nearby had to be hosed down to prevent their ignition by the intense heat fueled by the jet propellant and magnesium in the B-47. The fire killed two people, injured eight others, and destroyed the bomber.

The Air Force has never officially admitted that nuclear weapons were involved in this accident. The Air Force and British Ministry of Defence agreed in 1956 to deny the existence of nuclear weapons in any accident involving U.S. nuclear weapons stationed in England. In 1985, the British government reported that the accident involved a parked B-47 that was struck by a taxiing B-47 on a training exercise, omitting any mention of the ensuing fire.

"Activists Claim Proof of Nuclear Accident," *San Francisco Examiner*, July 15, 1996, p. A-11; Shaun Gregory, *The Hidden Cost of Deterrence: Nuclear Weapons Accidents*, Brassey's UK, London, 1990, p.152; From a report on Greenham Common Accident, "Broken Arrow," Center for Nuclear Disarmament, London, England, July 1996, http://www.cnduk.org/brokenarrow/index.html.

November 26, 1958, Chennault Air Force Base, Lake Charles, Louisiana

A B-47 bomber caught fire on the ground, destroying the single nuclear weapon onboard. Contamination was limited to the immediate vicinity of the aircraft wreckage.

July 6, 1959, Barksdale Air Force Base, Bossier City, Louisiana

A C-124 aircraft transporting a nuclear weapon without its fissile core crashed during takeoff, completely destroying the aircraft and nuclear weapon. There was a limited amount of contamination immediately below the destroyed weapon, but not enough to hamper rescue or firefighting operations.

June 7, 1960, McGuire Air Force Base, near Trenton, New Jersey

A BOMARC* air defense missile being stored in a ready state that permitted its launch in two minutes was destroyed after a high pressure helium tank exploded and ruptured the missile's fuel tanks. Although the warhead was also destroyed by the fire, the safety devices acted properly and prevented the weapon's high explosives from detonating. A *New York Times* article described a near nuclear disaster, noting that the missile "melted under an intense blaze fed by its 100-pound detonator TNT...The atomic warhead apparently dropped into the molten mass that was left of the missile, which burned for forty-five minutes." The ensuing radiation "had been caused when thoriated magnesium metal which forms part of the weapon, caught fire." The Pentagon report said that only the area immediately beneath the weapon and an adjacent elongated area approximately 100 feet long were contaminated by water runoff from fighting the fire.

* "BO" for Boeing and "MARC" for Michigan Aeronautical Research Center.

November 13, 1963, Atomic Energy Commission Storage Igloo, Medina Base, San Antonio, Texas

While three employees were dismantling the high explosive (HE) components of a nuclear bomb, they began burning spontaneously, triggering a large blast involving 120 pounds of HE. The explosion caused little contamination.

New York University's Dr. Joel Larus, who investigated the incident, was provided details of three similar incidents by the Atomic Energy Commission (AEC) on January 13, 1966. They are as follows:

Hamburg, New York (January 4, 1958)...An eastbound Nickel Plate railroad freight train derailed. Five cars carrying "AEC classified material" were involved in the accident. According to the report there was no damage to the material and no injury to AEC personnel escorting the shipment.

Winslow, Arizona (November 4, 1961)...A trailer truck caught fire while carrying a small amount of radioactive material. There was no contamination resulting from the fire.

Marietta, Georgia (December 2, 1962)...A Louisville and Nashville train derailed while carrying nuclear weapons components. The material was not damaged, but three couriers were injured.

As these accounts demonstrate, accidents of this nature probably happen more frequently than reported. For instance, a Department of Energy trailer carrying plutonium from Richland, Washington, to New Mexico overturned on icy roads on Interstate 25 near Fort Collins, Colorado, in December 1980.

December 8, 1964, Bunker Hill (now Grissom) Air Force Base, Peru, Indiana

A B-58 bomber lost control and slid off a runway during taxi, causing portions of the five nuclear weapons onboard to burn in an ensuing fire. There were no detonations and contamination was limited to the immediate area of the crash.

October 11, 1965, Wright-Patterson Air Force Base, near Dayton, Ohio

A C-124 transport aircraft containing nuclear weapons components and a dummy training unit caught fire while being refueled. The fire started at the aft end of the refueling trailer and destroyed the aircraft's fuselage. There were no casualties and the resultant radiation hazard was minimal.

January 17, 1966, Palomares, Spain

A B-52 bomber carrying four hydrogen bombs collided in midair with a KC-135 tanker near Palomares, Spain. Of the four H-bombs aboard, two weapons' high explosive material exploded on ground impact, releasing radioactive materials, including plutonium, over the fields of Palomares. Approximately 1,400 tons of slightly contaminated soil and vegetation were later taken to the United States for storage at an approved site. A third nuclear weapon fell to earth but remained relatively intact; the last one fell into the ocean.

The weapon that sank in the Mediterranean set off one of the largest search and recovery operations in history. The search took about eighty days and employed 3,000 Navy personnel and 33 Navy vessels, not including ships, planes, and people used to move equipment to the site. Although the midget sub "Alvin" located the bomb after two weeks, it was not recovered until April 7. Wreckage from the accident fell across approximately 100 square miles of land and water.

The accident occurred during a routine high altitude air refueling operation as the B-52 was returning to Seymour Johnson Air Force Base in Goldsboro, North Carolina, after flying the southern route of the Strategic Air Command air alert mission code named "Chrome Dome." The bomber was attempting its third refueling with a KC-135 tanker from the American base at Moron, when the nozzle of the tanker's boom struck the bomber. The boom ripped open the B-52 along its spine, snapping the bomber into pieces. The KC-135's 40,000 gallons of jet fuel ignited, killing seven crewmen.

January 21, 1968, Thule, Greenland

Four nuclear bombs were destroyed in a fire after the B-52 bomber carrying them crashed approximately seven miles southwest of the runway at Thule Air Force Base in Greenland. The B-52, from Plattsburgh Air Force Base in New York, crashed after a fire broke out in the navigator's compartment. The pilot was en route to Thule AFB to attempt an emergency landing. Upon impact with the ground, the plane burst into flames, igniting the high explosive outer coverings of at least one of the bombs. The explosive then detonated, scattering plutonium and other radioactive materials over an area about 300 yards on either side of the plane's path, much of it in "cigarette box-sized" pieces.

The bomber had been flying the Arctic Circle route as part of the Strategic Air Command's continuous airborne alert operation, code-name "Chrome Dome." One crew member was killed in the crash.

The government of Denmark, which owns Greenland and prohibits nuclear weapons on or over its territory, issued a strong protest following large demonstrations in that country. A few days after the crash, U.S. Secretary of Defense Robert McNamara ordered the removal of nuclear weapons from airborne alert. The alerts themselves were later curtailed and then suspended altogether.

September 19, 1980, Damascus, Arkansas

Fuel vapors from a Titan II intercontinental ballistic missile (ICBM) exploded in the missile's silo, blowing off the 740-ton silo door of reinforced concrete and steel and catapulting the missile's nuclear warhead 600 feet. The accident occurred when an Air Force repairman dropped a heavy wrench socket that struck the missile, causing a leak in the missile's pressurized fuel tank. The fuel caught fire and exploded approximately 8 ½ hours later, killing one person and injuring twenty-one others. The missile's reentry vehicle, which contained a nuclear warhead, was recovered intact.

WEAPONS LOST/MISSING

March 10, 1956, Over the Mediterranean Sea

A B-47 bomber carrying two nuclear weapon cores in their carrying cases disappeared over the Mediterranean Sea. The aircraft, on a nonstop flight from MacDill Air Force Base in

the Mediterranean Sea. The aircraft, on a nonstop flight from MacDill Air Force Base in Tampa, Florida, to an undisclosed overseas airbase, was lost with its crew. After takeoff the B-47 was scheduled for two in-flight-refuelings before reaching its final destination. The first refueling was successfully completed, but the aircraft never made contact with the second refueling tanker over the Mediterranean Sea. Despite an extensive search, no trace of the aircraft, the nuclear weapon cores, or crew, were ever found.

July 28, 1957, Over the Atlantic Ocean

A C-124 transport aircraft that was having mechanical problems jettisoned two nuclear weapons without their fissile cores off the east coast of the United States. The C-124 was en route from Dover Air Force Base in Delaware when it lost power to its number one and two engines. The crew determined that level flight could not be maintained with the weight of the weapons onboard and decided to jettison the cargo. Although neither weapon detonated, both are presumed to have been damaged from impact with the ocean surface and to have sunk almost instantly. Neither the weapons nor debris were ever found. The C-124 safely landed at an airfield near Atlantic City, New Jersey, with the remaining weapon and nuclear warhead aboard.

February 5, 1958, Savannah River, Georgia

A nuclear weapon without a fissile core was lost following a mid-air collision. A B-47 bomber carrying a nuclear weapon without its fissile core collided with a F-86 aircraft near Savannah, Georgia. Following three unsuccessful attempts to land the plane at Hunter Air Force Base in Georgia, the weapon was jettisoned to avoid the risk of a high explosive detonation at the base. The weapon was jettisoned into the water several miles from the mouth of Savannah River in Wassaw Sound off Tybee Beach, but the precise point of impact is unknown. The weapon's high explosives did not detonate on impact. A subsequent search covering three square miles used divers and sonar devices, but failed to find the weapon. The search was ended on April 16, 1958, and the weapon was considered to be irretrievably lost.

Some accounts of nuclear weapon accidents list a February 12, 1958, accident involving a B-47 near Savannah, Georgia. "The best estimate" of the weapon's location, an earlier DoD narrative noted, "was determined to be 31 degrees 54' 15" North, 80 degrees 54' 45" West." The B-47 was on a simulated combat mission from Florida's Homestead Air Force Base.

September 25, 1959, Off Whidbey Island, Washington

A U.S. Navy P-5M aircraft carrying an unarmed nuclear depth charge without its fissile core crashed into Puget Sound near Whidbey Island, Washington. The weapon was never recovered.

January 24, 1961, Goldsboro, North Carolina

In what nearly became a nuclear catastrophe, a B-52 bomber on airborne alert carrying two nuclear weapons broke apart in midair. The B-52 experienced structural failure in its right wing and the aircraft's resulting breakup released the two weapons from a height of 2,000-10,000 feet. One of the bomb's parachutes deployed properly and that weapon's damage was minimal. However, the second bomb's parachute malfunctioned and the weapon broke apart upon impact, scattering its components over a wide area. According to Daniel Ellsberg, the weapon could have accidentally fired because "five of the six safety devices had failed." Nuclear physicist Ralph E. Lapp supported this assertion, saying that "only a single switch" had "prevented the bomb from detonating and spreading fire and destruction over a wide area."

Despite an extensive search of the waterlogged farmland where the weapon was believed to have landed, the bomb's highly enriched uranium core was never recovered. In order to prevent any discovery of the lost portion of the weapon, the Air Force purchased an easement which required that permission be obtained before any construction or digging could begin in the area. Three crew members were killed in the crash.

The accident was apparently so serious that it was reported to newly-elected President John F. Kennedy. According to *Newsweek*, President Kennedy was informed after the accident that "there had been more than 60 accidents involving nuclear weapons" since World War II, "including two cases in which nuclear-tipped anti-aircraft missiles were actually launched by inadvertence." As a result of the Goldsboro accident, the U.S. placed many new safety devices on its nuclear arsenal and the Soviet Union was encouraged to do the same.

December 5, 1965, Aboard the USS *Ticonderoga* (CVA-14) in the Pacific Ocean

An A-4E Skyhawk strike aircraft carrying a nuclear weapon rolled off an elevator on the U.S. aircraft carrier *Ticonderoga* and fell into the sea. Because the bomb was lost at a depth of approximately 16,000 feet, Pentagon officials feared that intense water pressure could have caused the B-43 hydrogen bomb to explode. It is still unknown whether an explosion did occur. The pilot, aircraft, and weapon were lost.

The Pentagon claimed that the bomb was lost "500 miles away from land." However, it was later revealed that the aircraft and nuclear weapon sank only miles from the Japanese island chain of Ryukyu. Several factors contributed to the Pentagon's secretiveness. The USS *Ticonderoga* was returning from a mission off North Vietnam; confirming that the carrier

had nuclear weapons aboard would document their introduction into the Vietnam War. Furthermore, Japan's anti-nuclear law prohibited the introduction of atomic weapons into its territory, and U.S. military bases in Japan are not exempt from this law. Thus, confirming that the USS *Ticonderoga* carried nuclear weapons would signify U.S. violation of its military agreements with Japan. The carrier was headed to Yokosuka, Japan, and disclosure of the accident in the mid-1980s caused a strain in U.S.-Japanese relations.

Spring 1968, Aboard the USS *Scorpion* (SSN-589) in the Atlantic Ocean

Although the Pentagon has not publicly released details of the accident, it probably refers to the nuclear powered attack submarine USS *Scorpion* that was lost at sea. The sub, carrying unidentified nuclear weapons, was last heard from on May 21, 1968, while returning to Norfolk, Virginia, after a three month training exercise in the Mediterranean Sea. The USS *Scorpion* sank 400-500 miles southwest of the Azores.

The U.S. initially suspected that the Soviet Union was somehow involved. The suspicions were allayed when the research ship *Mizar* (T-AK-272) photographed the wreckage lying on the sea floor at 10,000 feet. A Navy court of inquiry found "no evidence of any kind to suggest foul play or sabotage," and found that the "certain cause of the loss of the *Scorpion* cannot be ascertained from evidence now available."

FALSE WARNING OF NUCLEAR LAUNCH AGAINST THE U.S.

October, 5, 1960, Thule, Greenland

An early-warning system radar malfunction falsely warned the North American Aerospace Defense Command (NORAD) headquarters of a "massive" Soviet ballistic missile strike approaching the United States. A fault in the computer system had removed two zeros from the radar's ranging components, causing the radar to detect what it believed was a possible missile attack at 2,500 miles. The radar was actually detecting a reflection from the moon, located 250,000 miles away.

> "We have highly trained and experienced personnel in charge of all phases of the warning process, and there is no chance that any irreversible actions would be taken based on ambiguous computer information."
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> *-Annual Report to the Congress for Fiscal Year 1982, Department of Defense, p. 121*

Shaun Gregory, *The Hidden Cost of Deterrence: Nuclear Weapons Accidents,* Brassey's UK, London, 1990, p. 156.

October 25, 1962, Volk Field Base, Wisconsin

An alarm bell indicating that a nuclear war with the Soviet Union was beginning went off accidentally during the height of the Cuban missile crisis. Pilots ran to their nuclear-armed aircraft and were ready to take off when the mistake was detected by an officer in the command post. The pilots were ordered to return.

Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons*, Princeton University Press, Princeton, New Jersey, 1993, p. 3.

June 3 and 6, 1980, Unknown Location

An alarm indicating a massive Soviet missile attack was registered by a communications computer connected to NORAD. A threat assessment conference was called, and 100 nuclear-armed B-52s were put on alert for imminent takeoff. Although the mistake was detected, the same computer produced an identical warning three days later on June 6, 1980. A threat assessment conference was again called and 100 nuclear-armed B-52s were put on alert for takeoff. The problem was later traced to the failure of an integrated circuit in a computer, which was producing random digits representing the number of missiles detected.

Shaun Gregory, *The Hidden Cost of Deterrence: Nuclear Weapons Accidents*, Brassey's UK, London, 1990, p. 178.

January 10, 1984, Warren AFB, Cheyenne, Wyoming

Warren Air Force Base in Cheyenne, Wyoming, recorded a message that one of its Minuteman III intercontinental ballistic missiles was about to launch from its silo due to a computer malfunction. To prevent the possible launch, an armored car was parked on top of the silo.

Shaun Gregory, *The Hidden Cost of Deterrence: Nuclear Weapons Accidents*, Brassey's UK, London, 1990, pp. 181-182.

ACCIDENTS RESULTING IN FATALITIES NOT INVOLVING FISSILE MATERIAL

July 13, 1950, Lebanon, Ohio

A B-50 bomber carrying a nuclear weapon without its fissile core crashed while on a training mission from Biggs Air Force Base near El Paso, Texas. Mechanical difficulties caused the bomber to nosedive from a height of 7,000 feet and crash. The weapon's high explosives detonated upon impact, causing an explosion felt well over 25 miles away and creating a crater 25 feet deep and 200 feet square. Four officers and twelve airmen were killed in the accident.

April 11, 1950, Manzano Base, Albuquerque, New Mexico

A B-29 bomber carrying a nuclear weapon, four spare detonators, and a crew of thirteen crashed into a mountain near Manzano Base in Albuquerque, New Mexico. The crash occurred within three minutes of departure from the Kirtland Air Force Base in Albuquerque, New Mexico, and resulted in a major fire which was reported by the *New York Times* as being visible from "fifteen miles." The bomb's casing was completely demolished and its high explosives ignited upon contact with the plane's burning fuel. However, according to the DoD, the four spare detonators and all nuclear components were recovered. A nuclear detonation was not possible because the weapon's core, while being carried on-board, was not placed in the weapon for safety reasons. All thirteen crew members were killed.

July 27, 1956, Lakenheath Royal Air Force Station, England

A B-47 bomber crashed into a storage igloo containing three MK-6 nuclear weapons while on a routine training mission at the Lakenheath Royal Air Force Station, 20 miles northeast of Cambridge, England. Although the bombs involved in the accident did not have their fissile cores installed, each of them carried about 8,000 pounds of high explosives as part of their trigger mechanism. The crash and ensuing fire did not ignite the high explosives and no detonation occurred. A retired Air Force general who was in England said later that if the weapons' high explosives had detonated, releasing radioactive material, "it is possible that a part of Eastern England would have become a desert." Another Air Force officer present at the scene said that it was only through "a combination of tremendous heroism, good fortune and the will of God" that a horrific nuclear weapons accident was avoided. The damaged weapons and components were later returned to the Atomic Energy Commission. The B-47 [illegible] 7th [illegible]

involved in the accident, which killed four crewmen, was part of the 307th Bombardment Wing.

November 4, 1958, Dyess Air Force Base, Abilene, Texas

A B-47 bomber carrying a nuclear weapon caught fire during takeoff and crashed from an altitude of 1,500 feet, killing one crew member. The resulting detonation of high explosives created a crater 35 feet in diameter and six feet deep. Nuclear materials from the weapon were recovered near the crash site.

October 15, 1959, Hardinsberg, Kentucky

A B-52 bomber carrying two atomic bombs collided at 32,000 feet with a KC-135 refueling aircraft shortly after initiating refueling procedures near Hardinsberg, Kentucky. The ensuing crash killed 8 crew members and partially burned one of the weapons. No nuclear material was released, however, and the unarmed weapons were recovered intact. Both planes had departed from Columbus Air Force Base in Mississippi.

***January 19, 1961, Monticello, Utah**

A B-52 bomber carrying one or more nuclear weapons was reported to have exploded in midair about 10 miles north of Monticello, Utah. The bomber had left Biggs AFB near El Paso, Texas, bound for Bismarck, North Dakota, on a routine "round-robin" training mission. Near Monticello the aircraft began climbing from 36,000 to 40,000 feet and soon experienced a violent bump followed by a descending right roll of about 410 degrees, a short period of wings-level, nose-down flight, and then a violent spin. The aircraft descended rapidly and at an elevation of 7,000 feet broke into several pieces that landed within an area two miles wide by 11 ½ miles long. Observers on the ground said the plane's left-wing engine caught fire, after which there was a midair explosion. Five crewmen were killed in the accident.

"Report of AF Aircraft Accident," January 19, 1961; "Missing Airman Found Dead," *The San Juan Record*, Monticello, Utah, January 27, 1961. Cited in Chuck Hansen, "Appendix 3: Typical U.S. Nuclear Weapon Accidents: 1950-1981, p. 34.

HIGH EXPLOSIVE DETONATION WITH NO SPREAD OF FISSILE MATERIAL

February 13, 1950, off the Coast of British Columbia

An American B-36 bomber was forced to jettison a weapon which exploded on impact. The bomber, carrying one weapon containing a dummy warhead, was flying a simulated combat mission from Eilson Air Force Base, near Fairbanks, Alaska, to Carswell Air Force Base in Fort Worth, Texas. After six hours of flight the bomber experienced mechanical problems and was forced to shut down three of its engines at an altitude of 12,000 feet. Fearing that severe weather and icing would jeopardize a safe emergency landing, the weapon was jettisoned over the Pacific Ocean from a height of 8,000 feet. The weapon's high explosives exploded upon impact. All sixteen crew members and one passenger were able to parachute to safety and were subsequently rescued from Princess Royal Island.

The Pentagon's summary report does not mention if the weapon was later recovered.

November 10, 1950, St. Lawrence River, St. Alexandre-de-Kamouraska, Canada

A B-50 bomber was forced to jettison a nuclear weapon containing high explosives (HE) but no nuclear material, causing the HE to detonate on impact. The bomb exploded near the middle of the 12 mile wide St. Lawrence River, rattling the windows of houses across a 25 mile area.

The accident occurred not long after takeoff when the aircraft lost power in two of its engines during a training flight as it was returning from Labrador, Canada, to its home base at Davis-Monthan AFB in Tucson, Arizona. Although the Pentagon's 1980 summary of nuclear accidents did not specifically mention the accident's location other than to say they were "over water, outside the United States," news reports and eyewitness accounts identified the location as being over the St. Lawrence River near St. Alexandre-de-Kamouraska, Canada. The DoD documents do not mention whether the weapon was recovered.

October 11, 1957, Homestead Air Force Base, Homestead, Florida

A B-47 bomber carrying a nuclear weapon and its separated fissile core crashed shortly after takeoff. The aircraft crashed in an inhabited area approximately 3,800 feet from the end of the runway, enveloping the nuclear weapon and its fissile core in flames which burned and smoldered for approximately four hours. Although two small explosions occurred during the burning, the weapon core and its carrying case were recovered intact and only slightly damaged by the heat. Approximately one-half of the weapon remained and all its major

components were recovered but damaged.

March 11, 1958, Florence, South Carolina

A B-47E accidentally jettisoned an unarmed nuclear weapon without its fissile core at 15,000 feet, which impacted in a sparsely populated area 6-1/2 miles east of Florence, South Carolina. The bomb's high explosive material exploded on impact, causing property damage and several injuries. The aircraft, which was heading to an undisclosed overseas base, returned to Hunter Air Force Base in Georgia without further incident.

Numerous accounts of the accident describe the bomb falling in the garden of Mr. Walter Gregg in Mars Bluff, South Carolina. The high explosive detonation virtually destroyed his house, creating a crater 50-70 feet in diameter and 25-30 feet deep. It caused minor injuries to Mr. Gregg and five members of his family, and damaged five other houses as well as a church. Following the accident, Air Force crews were ordered to "lock in" their nuclear bombs, which reduced the possibility of accidental drops but increased the danger during a plane crash.

OTHER MINOR INCIDENTS INVOLVING NUCLEAR MATERIALS

***January 9, 1956, Kirtland Air Force Base, New Mexico**

An incident involving a B-36 bomber carrying one or more nuclear weapons occurred on January 9, 1956, at Kirtland AFB in New Mexico, according to a February 1991 report by the U.S. Environmental Protection Agency (EPA). The report, however, provides no further details on the type of weapon involved or of any damage to the weapons onboard.

"Crash Site May Be Radioactive," *San Jose Mercury News*, April 9, 1992. Cited in Chuck Hansen, "Appendix 3: Typical U.S. Nuclear Weapon Accidents: 1950-1981," p. 9.

***February 1958, Aircraft Unknown, Location Unknown**

An unidentified aircraft crashed "on base" while carrying a MK-7 training weapon in February, 1958. Aircraft wreckage and weapons parts were scattered over an area

approximately 250 feet wide by 0.25 miles long. The largest piece of weapon recovered was located with part of the plane's tail section.

OOMA Airmunitions Letter 136-11-56A, Summary of Nuclear Weapons Incidents (AF Form 1058) and Related Problems, Calendar Year 1958, Headquarters Ogden Air Materiel Area, USAF, Hill AFB, Utah, 23 June 1960, p. 2. Cited in Chuck Hansen, "Appendix 3: Typical U.S. Nuclear Weapon Accidents: 1950-1981," p.18.

January 18, 1959, Unspecified Pacific Base

A grounded F-100 interceptor carrying a nuclear weapon without its fissile core burst into flames when its external fuel tanks were inadvertently jettisoned during a practice alert. The plane was carrying a payload of one nuclear weapon and three external fuel tanks. The fire was doused in about seven minutes and there were no contamination or cleanup problems.

***August 18, 1959, Aboard the Aircraft Carrier USS *Wasp* (CVS-18)**

A severe fire aboard the aircraft carrier USS *Wasp* threatened to engulf the nuclear weapons storage space and required flooding of the forward ammunition stores. Foam was pumped through the flight deck, and the crew prepared to flood the nuclear weapons storage spaces. The fire was brought under control before that command was given.

William Arkin and Joshua Handler, *Naval Nuclear Accidents: The Secret History*, Greenpeace, Vol. 14, #4, July/August 1989, p. 17.

***January 16, 1961, Undisclosed U.S. Air Force Base, Britain**

A nuclear bomber on round-the-clock alert crashed on takeoff causing spilled fuel to erupt into flames which engulfed the aircraft at an undisclosed USAF base in Britain. A nuclear weapon mounted on the aircraft's centerline pylon was badly damaged before the fire could

be put out. According to secret correspondence to the Chairman of the U.S. Joint Commission on Atomic Energy (JCAE), the accident was so serious that the weapon was "scorched and blistered." The U.S. Government has never acknowledged the accident and it is not included on the DoD's list of broken arrows.

January 23, 1961, letter from Herbert B. Loper, Assistant to the Secretary of Defense (Atomic Energy) to Honorable Clinton P. Anderson, Chairman, JCAE. Cited in Chuck Hansen, "Appendix 3: Typical U.S. Nuclear Weapon Accidents: 1950-1981," p. 31; Eddie Goncalves, "Broken Arrow," Center for Nuclear Disarmament, http://www.cnduk.org.

March 14, 1961, Yuba City, California

A B-52 bomber carrying two nuclear weapons crashed, tearing the weapons from the aircraft on impact. The weapons' high explosive did not detonate and their safety devices worked properly. The aircraft had departed from Mather Air Force Base near Sacramento and was forced to descend to 10,000 feet after the crew compartment pressurization system failed. Flying at the lower altitude increased the plane's fuel consumption, causing it to run out of fuel prior to its scheduled rendezvous with a tanker.

***June 4, 1962, Pacific Ocean Near Johnston Atoll**

A nuclear test device atop a Thor rocket booster fell into the Pacific Ocean near Johnston Atoll after the booster malfunctioned and was destroyed minutes after liftoff. The test was the United States' first attempt at conducting a high-altitude atmospheric nuclear test.

William Arkin and Joshua Handler, *Naval Nuclear Accidents: The Secret History*, Greenpeace, Vol. 14, #4, July/August 1989, p. 16; Joshua Handler, Amy Wickenheiser and William Arkin, *Naval Safety 1989: The Year Of The Accident*, Greenpeace, Neptune Papers, # 4, April 1990, p. 25.

***June 20, 1962, Thor Rocket, Pacific Island**

A second attempt to detonate a nuclear device in the high atmosphere failed when a Thor booster malfunctioned over Johnston Atoll. The nuclear device fell into the Pacific Ocean.

William Arkin and Joshua Handler, *Naval Nuclear Accidents: The Secret History*, Greenpeace, Vol. 14, #4, July/August 1989, p. 16; Joshua Handler, Amy Wickenheiser and William Arkin, *Naval Safety 1989: The Year Of The Accident*, Greenpeace, Neptune Papers, # 4, April 1990, p. 25.

January 13, 1964, Cumberland, Maryland

A B-52D bomber carrying two nuclear weapons crashed approximately 17 miles southwest of Cumberland, Maryland. The nuclear weapons were being transported in a tactical ferry configuration, meaning that no mechanical or electrical connections had been made from the bombs to the aircraft. The bomber was en route from Westover Air Force Base in Chicopee Falls, Massachusetts, to its home base at Turner Air Force Base in Albany, Georgia, when it encountered violent turbulence. During an altitude change from 29,500 to 33,000 feet, the aircraft encountered more violent air turbulence and suffered structural failure. Both weapons were recovered relatively intact.

December 5, 1964, Ellsworth Air Force Base, Rapid City, South Dakota

A retrorocket located below an LGM 30B Minuteman I missile's Reentry Vehicle (RV) fired while two repairmen were working nearby, sending the reentry vehicle crashing down to the bottom of its silo. The arming and fusing/altitude control subsystem containing the RV's batteries were torn loose on impact, removing all sources of power from the RV and causing it considerable damage. The missile's safety devices operated properly and did not allow the warhead to become armed. The Minuteman I was on strategic alert.

January 19, 1966, Aboard the USS *Luce* (DLG-7)

A W-45 nuclear warhead separated from a Trier surface-to-air missile and fell 8 feet while it was being loading on the frigate USS *Luce*. The warhead was dented but otherwise unharmed. The incident was first documented in the "Chronology of Nuclear Accident Statements" released by the Department of Defense in 1968.

***February 22, 1970, Boetingen, West Germany**

A nuclear warhead from a Pershing ballistic missile fell to the pavement during maintenance procedures. The launch pad was evacuated and the area sealed off. The warhead, however, did not detonate.

The incident occurred when a crewman, working alone in violation of regulations that require at least two persons to be present around nuclear weapons, accidentally removed an explosive bolt and its detonating cable, causing the warhead to fall. The fall broke off approximately a one-half inch piece of the missile's nosecone and also put a two inch gouge in the nosecone and badly scratched the warhead's ablative material. The incident was originally reported as a "Broken Arrow," but was later downgraded to a "Bent Spear" incident.

Nine teletypes dated February 22, 23 and 27, and March 10, 1970, to Commander-in-Chief, U.S. Army in Europe, Heidelberg, Germany. Cited in Chuck Hansen, "Appendix 3: Typical U.S. Nuclear Weapon Accidents: 1950-1980," p. 59.

***November 10, 1970, USS *Canopus* (AS-34)**

A fire broke out in the stern of the U.S. Navy submarine tender USS *Canopus* which was carrying several nuclear-armed missiles. The tender was at the Holy Loch submarine base in Scotland moored alongside two American nuclear-powered ballistic missile submarines. It took four hours to bring the fire under control.

"Selected Accidents Involving Nuclear Weapons -1950-1993," Greenpeace, http://www.greenpeace.org.

***February 14, 1974, Plattsburgh AFB, New York**

The nose landing gear of a USAF FB-111 carrying two short range attack air-to-surface missiles and two nuclear bombs collapsed as the aircraft was commencing an engine run-up during an alert exercise. There was no damage to the weapons and they were unloaded without incident.

February 15, 1974, letter from Brig. Gen. James R. Brickel, USAF, Deputy Assistant to the Secretary of Defense for Atomic Energy, to Edward J. Bauser, Executive Director, JCAE. Cited in Chuck Hansen, "Appendix 3: Typical U.S. Nuclear Weapon Accidents: 1950-1980," p. 59.

***October 23, 1975, Yucca Flats, Nevada**

A canister containing a nuclear weapon's fissile core fell 40 feet to the bottom of a shaft during preparations for an underground nuclear test at the Nevada Test Site. The warhead had a yield of less than 20 kilotons. Although the warhead did not detonate and there was no leakage of radioactive material, 11 Nevada Test Site workers were injured. The device was to be detonated as part of a series of underground tests code-named "Peninsula."

The incident was verified by U.S. Energy Research and Development Administration (ERDA) spokesman, David Miller. According to the ERDA, safety mechanisms built into the warhead precluded the possibility that the device could have accidentally detonated.

The Washington Star, October 30, 1975, p. 2 (31).

November 22, 1975, Aboard the USS *Belknap* (DLG-26) and USS *John F. Kennedy

(CVA-67), 70 Miles East of Sicily, Italy

During night exercises the aircraft carrier USS *John F. Kennedy* and the cruiser USS *Belknap* collided, lodging the *Belknap's* superstructure beneath the Kennedy's overhanging flight deck. The carrier's fuel lines were ruptured, spreading gasoline over the deck of the *Belknap,* which ignited and burned for more than two hours.

Although this accident is one of the best-known and well-documented nuclear weapons accidents, the presence of nuclear weapons onboard the *Belknap* and the *Kennedy* have never been publicly acknowledged by the Navy or Pentagon. However, documents obtained by Greenpeace show that minutes after the incident occurred, the commander of Carrier Striking Forces for the Sixth Fleet sent a secret nuclear weapons accident message (a "Broken Arrow") to the Pentagon, warning of the "high probability that nuclear weapons aboard the *Belknap* were involved in fire and explosion." The story has been corroborated by a retired admiral who was aboard the *Belknap* at the time of the accident.

One of the ships that came to the *Belknap*'s aid was the nuclear-capable frigate USS *Bordelon*, which collided with the USS *John F. Kennedy* a year later 75 miles north of Scotland. That ship's anti-submarine rocket (ASROC) container, where nuclear weapons would normally be held, was nearly crushed.

***April 16, 1976, Aboard the Cruiser USS *Albany* (CG-10)**

The Cruiser USS *Albany* experienced a nuclear weapons incident -- known as a "Dull Sword" -- when a TALOS surface-to-surface missile's nuclear warhead was damaged.

"Selected Accidents Involving Nuclear Weapons -1950-1993," Greenpeace,

http://www.greenpeace.org.

***November 28, 1977, West Germany**

An army CH-47 carrying nuclear warheads on a logistical move crashed shortly after takeoff when a fire caused the helicopter to lose power to an engine. The fire was extinguished and the weapons were safely removed to a storage site.

"Dull Sword" Incident. Teletype dated November 28, 1977, to Commander, Field Command Defense Atomic Support Agency, Kirtland AFB, from Commander, Army Armament Materiel Readiness Command (ARRCOM), Rock Island, Illinois. Cited in Chuck Hansen, "Appendix 3: Typical U.S. Nuclear Weapon Accidents: 1950-1980," p. 60.

***September 15, 1980, Grand Forks AFB, North Dakota**

A B-52H bomber carrying nuclear-armed AGM-69 short range attack missiles caught fire while on the ground during an alert exercise. A strong wind and firefighters managed to keep the intense flames away from the missiles. The fire was caused by a fuel leak and burned intensely, fed by fuel from the Number Three main wing tank. The fire burned for more than three hours and was extinguished only after the fuel flow had ceased.

Lawrence Livermore National Laboratory Director Roger Batzel later testified that if "the wind was blowing down the axis of the airplane, the whole aircraft [including its load of nuclear-armed missiles] would have been engulfed in flames."

USAF Mishap Report, Headquarters 15th Air Force, March AFB, California, September 29, 1980; "North Dakota's Near-Nuclear Disaster," *Peninsula Times Tribune*, August 13, 1991, pp. A-1, A-6; Kidder UCRL-LR-107454, p. E1. Cited in Chuck Hansen, "Appendix 3:

Typical U.S. Nuclear Weapon Accidents: 1950-1980," p. 61.

***April 9, 1981, Aboard the USS *George Washington* (SSBN-598) in the South China Sea**

The nuclear-powered ballistic missile submarine USS *George Washington* collided with a Japanese freighter in the East China Sea, causing slight damage to the submarine's sail and

sinking the freighter. The submarine carried up to 160 nuclear warheads on its 16 Poseidon C-3 sea-launched ballistic missiles.

***March 12, 1984, Aboard the USS *Kitty Hawk* (CV-63)**

The aircraft carrier USS *Kitty Hawk* collided with a Victor-class Soviet nuclear-powered attack submarine in the Sea of Japan. At the time of the collision, the USS *Kitty Hawk* was carrying up to several dozen nuclear weapons, and the Soviet submarine probably carried two nuclear torpedoes.

"Selected Accidents Involving Nuclear Weapons -1950-1993," Greenpeace, http://www.greenpeace.org.

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