Dangers Inherent to Nuclear Arsenals

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1. Dangers due to mistakes in Command and Control
2. Dangers due to handling nuclear weapons
3. Dangers specific to new nuclear powers

Copies of these slides can be found at http://mit.edu/stgs/index.html

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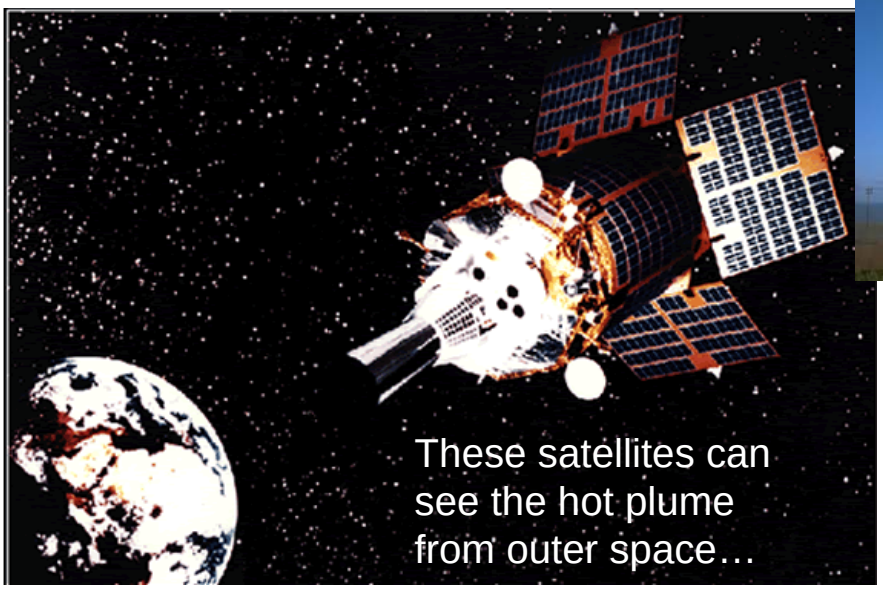
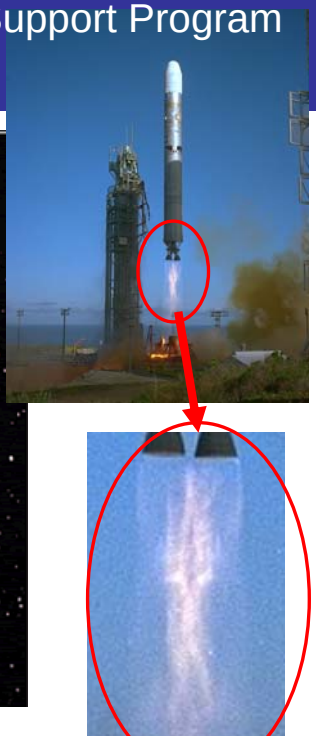
Shortly before 9am, on November 9, 1979, NORAD's computer screens showed a massive nuclear attack on the US…

US nuclear forces were put on heightened alert…

…a National Threat Assessment Conference at the Pentagon's National Military Command Center was convened…

Fortunately, the National Threat Assessment Conference was able to review the raw data from the Defense Support Program satellites…





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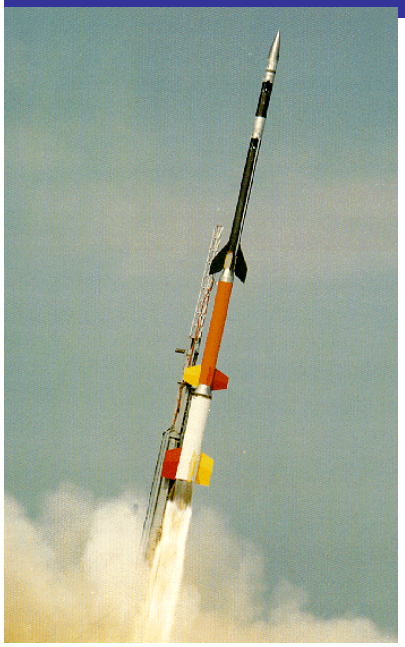
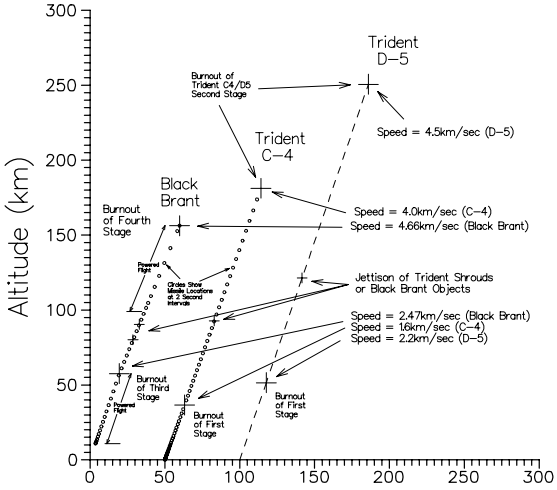
No Launches were detected! The alert was canceled and the US nuclear forces stood down.

Later it was determined that someone had placed a training tape—featuring all the signs of a realistic massive attack—in the computer just before shift change.

A January 26, 1995 sounding rocket launch triggered an increased Russian alert level



Many of the Black Brant XII's characteristics appeared similar to a Trident's.



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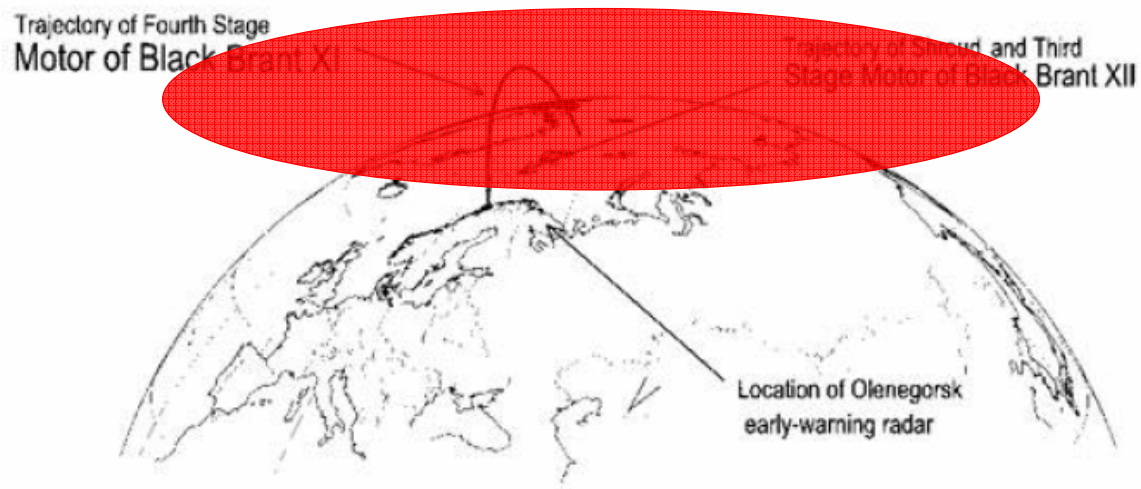
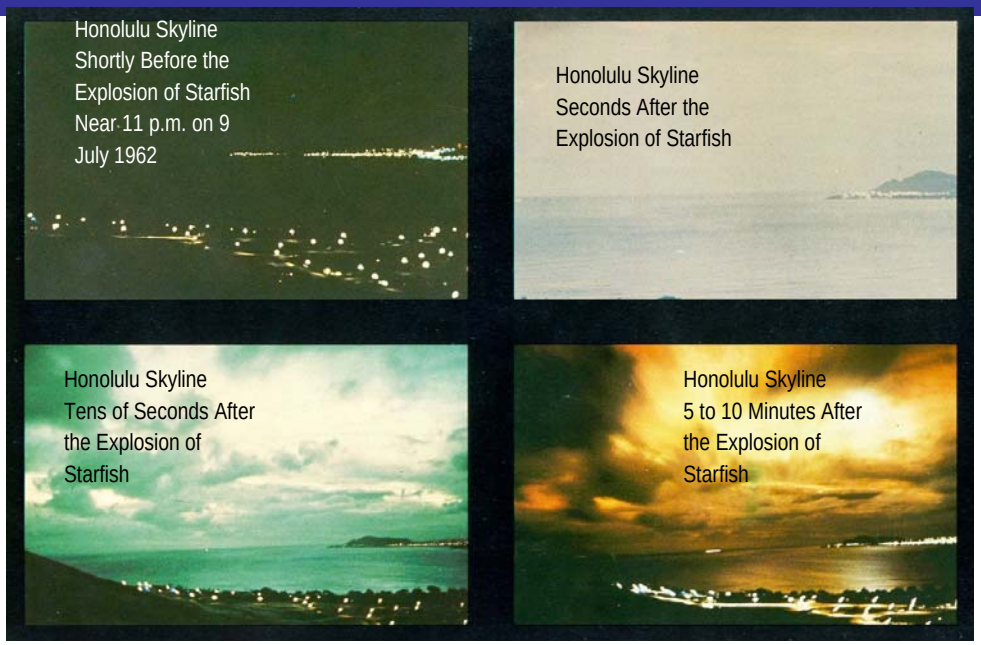
Even though the Black Brant was heading away from Russia, it looked like a classic "precursor" attach:

What Russia was concerned about:



Nuclear explosions in outer space can create a vast area of ionization which radars cannot penetrate



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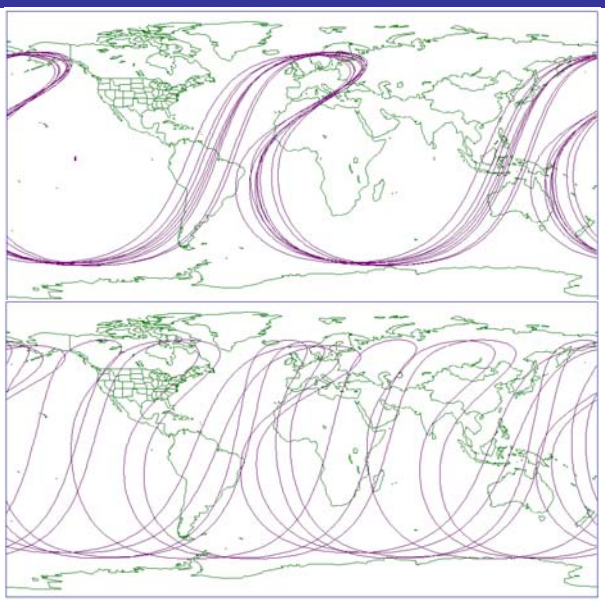
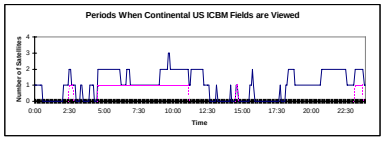
Finical difficulties greatly curtailed Russia's ability to deploy Early-warning satellites in the late 1990's

1995

Pres. Yeltsin used his "nuclear football" to watch their Early Warning Satellites for signs a massive attack was below the horizion



2001



Even routine alert levels can cause accidental nuclear detonations.

June 7, 1960, a on-alert BOMARC nuclear-tipped air defense missile burned, **melting the plutonium pit in the warhead.**

January 16, 1961, A US fighter on quick reaction alert was accidentally burned while loaded with a nuclear weapon. **The Genie (1.7 Kt) nuclear warhead was scorched and blistered**.

Unfortunately, there are all too many other examples of accidents involving nuclear weapons!

27 July 1956—RAF Base Lakenheath. A B-47 practicing touch-and-go landings, slid off the runway and crashed into a nuclear weapons storage igloo spilling jet fuel from the bomber. Fire engulfed the storage igloo and the nuclear weapons inside.

31 January 1958—SAC Base Reflex, French Morocoo. A B-47 with one nuclear weapon in full strike mode, skidded off the end of the runway, rupturing its fuel tanks and spilling jet fuel over the weapon. The base was evacuated fearing a nuclear explosion.

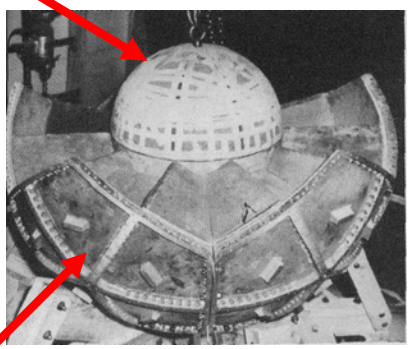
11 March 1958—Florence, South Carolina. During a SAC exercise, a B-47 accidentally released a nuclear weapon over a sparsely populated area near Florence. The high explosive in the weapon exploded on impact but there was no nuclear detonation.

4 November 1958, Dyess AFB, Abilene, Texas—A B-47 caught fire on takeoff with one nuclear weapon onboard. The weapon's high explosive detonated (causing a crater 35 feet in diameter and six feet deep) but did not cause a nuclear explosion.

"Developing" Nuclear Powers have their own, unique dangers

Currently, both India and Pakistan are believed to stockpile their nuclear weapons as separate pieces:

Plutonium pit



Conventional high explosives

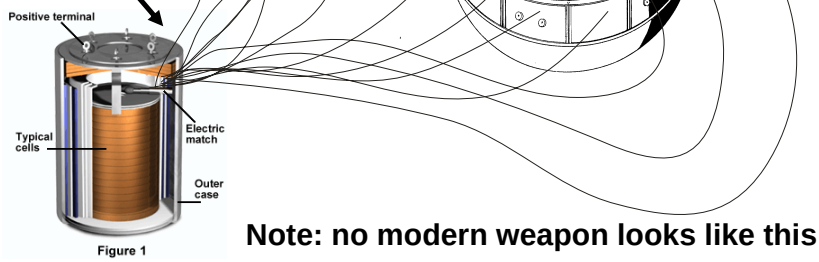
Without the surrounding conventional explosives, the pit cannot be compressed to cause a nuclear explosion.

However, both will presumably assemble their nuclear weapons in times of political tension!

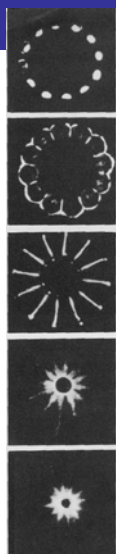
One Example of 1-Point Safing:

Detonator cables

Inserting a mechanical connection that has both a high probability of making the connection when wanted and not making it when not wanted.

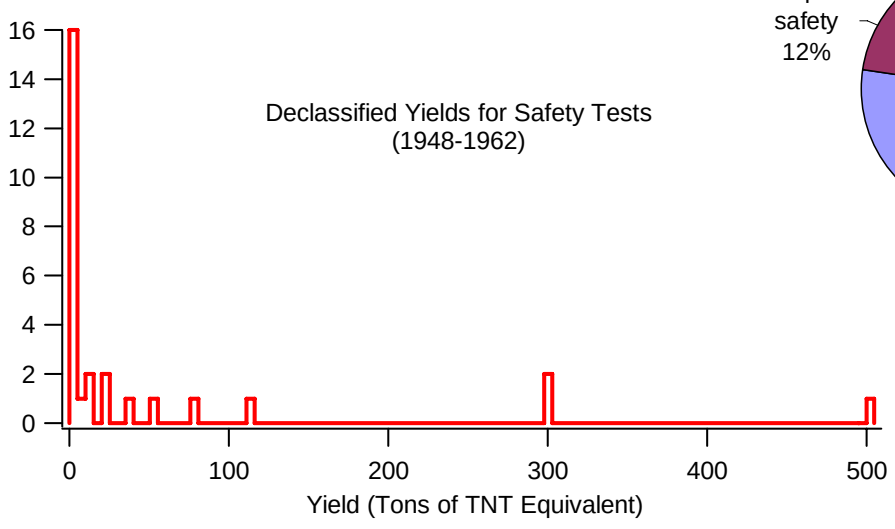


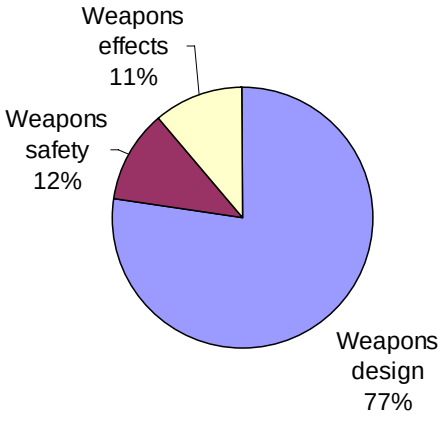
The nuclear pit needs to be compressed symmetrically, but that might be possible if a short occurs near the battery.



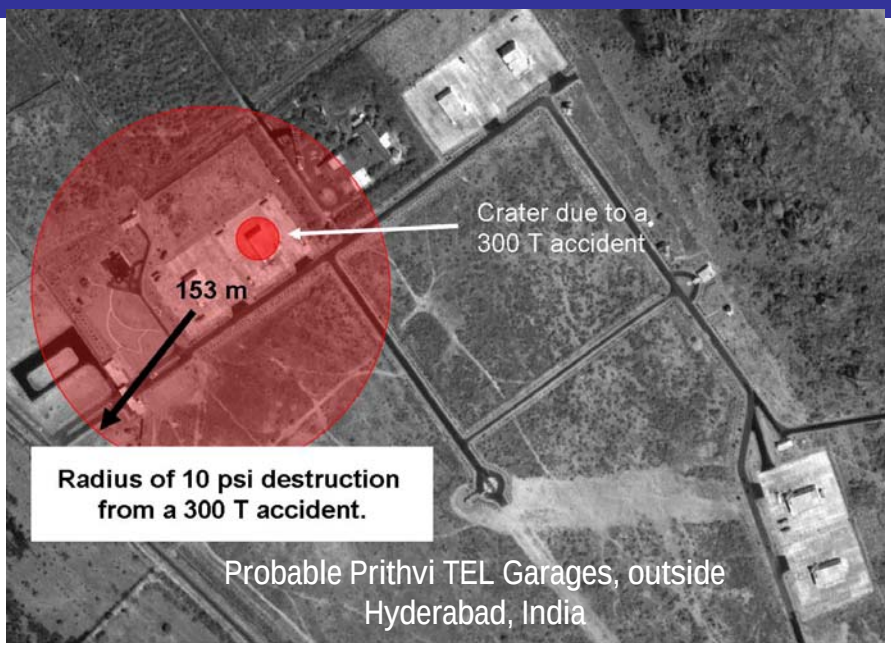
Note: no modern weapon looks like this!

The US has experienced a number of failures of one-point safety designs





In a period of increased tension, what would a country think if one of its nuclear weapons accidentally detonated?



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