= STRAT @-@ X =

STRAT @-@ X , or Strategic @-@ Experimental , was a U.S. government @-@ sponsored study conducted during 1966 and 1967 that comprehensively analyzed the potential future of the U.S. nuclear deterrent force . At the time , the Soviet Union was making significant strides in nuclear weapons delivery , and also constructing anti @-@ ballistic missile defenses to protect strategic facilities . To address a potential technological gap between the two superpowers , U.S. Secretary of Defense Robert McNamara entrusted the classified STRAT @-@ X study to the Institute for Defense Analyses , which compiled a twenty @-@ volume report in nine months . The report looked into more than one hundred different weapons systems , ultimately resulting in the MGM @-@ 134 Midgetman and LGM @-@ 118 Peacekeeper intercontinental ballistic missiles , the Ohio @-@ class submarines , and the Trident submarine @-@ launched ballistic missiles , among others . Journalists have regarded STRAT @-@ X as a major influence on the course of U.S. nuclear policy .

= = Background = =

In the mid @-@ 1960s , reports received by U.S. intelligence agencies indicated that the Soviets were planning to deploy large numbers of highly accurate and powerful intercontinental ballistic missiles (ICBMs) . Later , the R @-@ 36 ICBM entered service . Possessing the greatest throw weight of any ICBM ever at 8 @.@ 8 tonnes (19 @,@ 000 lb) , the R @-@ 36 was larger than the most modern ICBMs in the U.S. arsenal at the time . Due to its size , it was able to carry high @-@ yield warheads capable of destroying Minuteman hardened silos (see Counterforce) . This was considered a significant risk to American ICBMs and , as a result , to the United States ' nuclear defense strategy by reducing the United States ' ability to retaliate with nuclear weapons if attacked .

At the same time , the Soviets were designing and constructing increasingly sophisticated anti @-@ ballistic missile defense systems to protect strategically important facilities around Moscow , reducing the threat posed by American ICBMs . These developments compelled the U.S. Secretary of Defense , Robert McNamara , to commission a study to look into ways of improving the survivability of the U.S. nuclear arsenal .

According to Graham Spinardi in his book From Polaris to Trident (1994) , STRAT @-@ X was a response by the U.S. Department of Defense 's Deputy Director of Defense Research and Engineering , Lloyd Wilson , to the U.S. Air Force ; the service was demanding a large ICBM called the WS @-@ 120A . Spinardi suggests that STRAT @-@ X was allowed to proceed so it could terminate the study for such a missile . Funding for the WS @-@ 120A would not be released by Secretary McNamara , and plans for such a missile were canceled in 1967 .

= = Study = =

The study was named " STRAT @-@ X " in order not to reveal its intentions , and also to eliminate partiality towards sea- , air- or land @-@ based systems . It was conducted by the Research and Engineering Support Division of the independent and non @-@ profit Institute for Defense Analyses (IDA) , which had conducted a study in early 1966 titled " Pen @-@ X " , upon which STRAT @-@ X was based . STRAT @-@ X was chaired by President of the IDA , General Maxwell D. Taylor , while the institution 's Fred Payne presided over STRAT @-@ X 's " working " panel . The panel also included executives from major independent corporations and defense contractors such as Boeing , Booz Allen Hamilton , Thiokol and TRW . The Advisory Committee members were mostly military officers , including U.S. Navy Rear Admirals George H. Miller and Levering Smith .

On 1 November 1966 , McNamara signed an order authorizing STRAT @-@ X , officially initiating the study . During STRAT @-@ X , the working panel was " encouraged to examine system concepts unrestrained by considerations of potential management problems or political influences . " The Secretary wanted new ideas about " path @-@ breaking " weapons systems that were either

offensive or defensive in nature , unhindered by defense bureaucracy , which had the potential to stifle innovation . Sea- , land- and air @-@ based missile systems were investigated , but manned bombers and orbital systems were not . The group was also asked to consider the cost effectiveness of all systems , as well to predict possible Soviet responses . To meet this requirement , a series of documents were written from the perspective of the Soviet Minister of Defense General Andrei Grechko , complete with anti @-@ capitalistic statements and a prediction of the eventual triumph of socialism . In the end , a twenty @-@ volume report covered no fewer than 125 different ideas for missile systems , nine of which were reviewed in great detail .

= = = Findings and consequences = = =

Of the nine prospective weapons systems , five were land @-@ based . These were : " Rock Silo " ? a system where missiles would be stored in hardened silos of granite bedrock in the Western and Northern United States ; " Soft Silo " ? a similar system but with easily and cheaply constructed silos ; " Rock Tunnel " ? a system where missiles would be transported around in deep underground networks before emerging at launch points ; " Soft Tunnel " ? a similar tunnel but built more cheaply and easily ; and " Land Mobile " ? a truck @-@ based system where road @-@ transporters traveled at speeds up to 35 miles per hour (56 km / h) constantly around a dedicated and winding road system in 65 @,@ 000 square miles (170 @,@ 000 km2) of public land .

Of the remaining four , three were sea @-@ based . These were : " Canal @-@ Based " ? a systems where missiles would be sailed in canals to confuse Soviet military planners ; " Ship @-@ Based " ? a system where ships carrying missile canisters would travel around the world , hiding among other traffic ; and " Submarine @-@ Based " ? a system where ballistic missile submarines would roam the oceans while carrying missile canisters outside their pressure hulls . The single air @-@ based based consideration was the " Air Launched ICBM " , which required large aircraft carrying standoff ballistic missiles to launch their payloads at the Soviet Union .

Despite the numerous options investigated during the study , none were fully implemented . Although the STRAT @-@ X " Land Mobile " option resulted in the MGM @-@ 134 Midgetman and LGM @-@ 118 Peacekeeper missiles , the fall of communism throughout the late 1980s and early 1990s resulted in the Midgetman being canceled while still a prototype , while only 50 out of the original 100 Peacekeeper missiles were ever fielded . Nevertheless , the study did inspire a number of developments in nuclear weapons delivery systems . In October 1974 , the U.S. Air Force successfully conducted an air launch of a Minuteman missile from a C @-@ 5 Galaxy , demonstrating the credibility of the " Air Launched ICBM " option of STRAT @-@ X.

Although the U.S. Navy then had several classes of ballistic missile submarines and submarine @-@ launched ballistic missile (SLBM) in service , the study placed a significant emphasis on the survivability of SLBMs . This resulted in the enormous Ohio @-@ class submarine and the Trident SLBMs which the Ohio class carried . The study originally called for dedicated slow @-@ moving missile @-@ carrying submarines (instead of converted attack submarines) to embark missiles outside their hulls and rely primarily on stealth for survivability . However , Admiral Hyman Rickover , director of the Naval Reactors office , wanted a boat capable of a burst of high speed in order to affect a safe " getaway " after launching the boat 's payload . As a result , the Ohio class was designed to accommodate enormous nuclear reactors to produce the required speed . Ohio @-@ class submarines carry their missiles inside of their hulls , despite STRAT @-@ X 's recommendation . Ohio @-@ class submarines and Trident missiles are still in service as of 2016 .

Weapons systems inspired by STRAT @-@ X

= = Legacy = =

STRAT @-@ X had far @-@ reaching effects on the development and deployment of U.S. nuclear forces . It was the first time that the strategic requirements of the U.S. Armed Forces were addressed in a detailed and analytical manner . In a 2002 report by the RAND Corporation , STRAT @-@ X was described as " one of the most influential analyses ever conducted " for the U.S.

Department of Defense . Journalist Peter Grier , in his Air Force magazine article " STRAT @-@ X " , described the study as " a wide @-@ ranging look at the future of U.S. weapons that shaped the nuclear triad for decades , and remains a model for such efforts today " . In 2006 , the Defense Science Board (DFS) noted STRAT @-@ X 's introduction of ideas and concepts that resulted in the Ohio @-@ class submarines and small and mobile ICBMs . The DFS also attributed the use of air @-@ launched cruise missiles , particularly those carried by the B @-@ 52 Stratofortress , to STRAT @-@ X despite their lack of references in the study .